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Settlement, Mobility, and the Organization of Technology at the Clark Lake Site (22SH535): A Small-Scale Woodland Settlement

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SETTLEMENT, MOBILITY, AND THE ORGANIZATION OF TECHNOLOGY AT THE CLARK LAKE SITE (22SH535): A SMALL-SCALE WOODLAND SETTLEMENT

by

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ABSTRACT

SETTLEMENT, MOBILITY, AND THE ORGANIZATION OF TECHNOLOGY AT THE CLARK LAKE SITE (22SH535): A SMALL-SCALE WOODLAND SETTLEMENT

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Research conducted on the Woodland period in the Lower Mississippi Valley has largely focused on ceramic analysis of assemblages from large-scale settlements. Very little research has been conducted on lithic technology, particularly debitage from small sites. The Clark Lake site in the Lower Yazoo Basin is a small-scale settlement with components dating from the Tchula Phase to the Lake George I phase (circa 500 B.C.-1500 A.D.). This thesis focuses on the lithic assemblage recovered from the Middle - Late Woodland occupation of Clark Lake. Analysis of lithic debitage provides evidence concerning site function at this small-scale Woodland settlement.

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CHAPTER I

INTRODUCTION

Lithic debitage or debris left over from the manufacturing of stone tools is arguably the most common artifact type found on archaeological sites worldwide, and it is the least understood because of years of being neglected or ignored as prehistoric trash or debris (Carr & Bradbury, 2001). Lithic debitage has gradually gained in importance as an artifact class that can be used as an interpretive tool to make inferences about subsistence practices, settlement patterns, procurement of raw materials, organization of technology, and exchange in prehistoric cultures. Lithic analysis has grown tremendously over the past three decades with the development of new methods and innovative theories to make inferences about prehistoric behavior. Regrettably, most lithic studies in the Southeastern United States do not reflect these advances and have several fundamental problems, which have been outlined by Carr and Bradbury (2000).

This thesis presents an analysis of lithic debitage from the Clark Lake site using methods developed by lithics researchers. This effort will add to our understanding of settlement, mobility patterns, and the organization of technology at small-scale Woodland settlements in the Southeast and, to be more specific, in Mississippi and the Mississippi Delta.

Site Overview

Clark Lake is an archaeological site situated next to an oxbow lake in Sharkey County within the Delta National Forest. It is a wooded lot, approximately 30 x 190 meters in size (roughly 1.41 acres), located approximately 300 meters northwest of Clark Lake, from which the site gained its name, 1,000 meters south of the Big Sunflower River and 2,500 meters north of the Yazoo River. It was first excavated during June of 1999, in conjunction with the United States Department of Agriculture's U.S. Forest Service, as part of The University of Southern Mississippi's field school. During this three-week field school, a total of 50 shovel test pits were dug and nine square meters units were excavated to evaluate the site boundaries. This excavation produced over 2,800 prehistoric artifacts, including 646 pieces of lithic debitage, of which 560 were found in one unit, and two chipped-stone tools. In order to try and understand the nature and extent of the lithic tool manufacturing taking place in the area where the 560 flakes were collected, a second excavation, covering four and one-fourth square meters, was conducted in December 2009 and January 2010. This excavation produced over 1,400 prehistoric artifacts, including over 1,000 pieces of ceramic, 197 pieces of lithic debitage, 133 pieces of micro-debitage, and one broken chipped-stone tool, along with a hearth feature and several post molds.

Based upon the archaeological analysis of the ceramics recovered from the site, Clark Lake has been determined to be a multi-component site that was repeatedly occupied over approximately 2,000 years beginning within the Tchula phase starting around 500 B.C. and continuing into the Lake George I phase, which began about 1,500 A.D. However, the lithics from the site have been associated with the Issaquena phase based upon the ceramics.

Background of Research Interest

In the Mississippi Delta, the majority of research conducted has focused on the study of ceramics as cultural and chronological markers, as well as ceremonial and mortuary patterns. This is particularly true for the Middle Woodland period, which began around 1 A.D. and continued to around 600 A.D. For years, lithic analysis has not been a significant part of archaeology in the Mississippi Delta because the availability of raw material suitable for chipped-stone tool manufacture is limited (Carr, 2008). This makes lithic use strategies a particularly interesting area to study because it has "great potential to provide significant information about the past and can serve as a critical line of evidence when developing and testing hypotheses concerning prehistoric behavior" (Carr, 2008, p.201). As Shott has argued, debitage can provide as much, if not more, information than any formal or informal tools recovered from a site because they are abundant and imperishable (Shott, 1994).

The examination of hunter-gatherer settlement and mobility patterns has received increasing attention in anthropology over the years. Archaeologists have been and are working to document the variability in settlement and mobility patterns of these prehistoric peoples through time, space, and form, and several hypotheses have been developed to explain settlement and mobility of prehistoric hunter-gatherers from the Southeastern United States (Bradbury & Carr, 1995; Cable, 1996). The widest scope of work on hunter-gatherer archaeology, however, has been influenced in large part by the ethno-archaeological work of Lewis Binford (1978a, 1978b, 1979, 1980, 1983). Based on fieldwork with the Nunamiut, Binford developed a number of important ideas about the organizational strategies of hunter-gatherers, such as site formation processes related to curated and expedient tool use, the relationship between mobility strategies and differences in effective temperature, and the notion that hunter-gatherer mobility can be understood as a result of different emphases on residential versus logistical forms of mobility. These organizational, technological, and settlement mobility strategies are ultimately part and parcel of an adaptive response to spatial and temporal variations in resource structure that are embedded in hunter-gatherer subsistence practices.

These models continue to be used by archaeologists to interpret prehistoric hunter-gatherer behaviors in general, but they have not been widely applied to sites dated to the Woodland Period. Consequently, there is a historical lack of research interest in the area of prehistoric settlement, mobility patterns, and the organization of technology because most of the work in the Southeast is "often viewed through the lens of the contact era ethnohistoric record" and "conditioned by what [is known] of Mississippi period adaptation" (Kidder, 2002, p. 66).

Several studies of prehistoric hunter-gatherer settlement and mobility patterns are based on the analysis of lithic assemblages using the organization of technology approach (Andrefsky, 1994; Bamforth, 1986, 1991; Carr, 1994; Ingbar, 1994; Nelson, 1991; Parry & Kelly, 1987). The organization of technology has been described by Nelson as, "the selection and integration of strategies for making using, transporting, and discarding tools and the materials needed for their manufacture and maintenance" (Nelson, 1991, p. 57). Research in the areas of site function and settlement patterning are dependent on the assumption that there is a direct relationship between settlement patterning and mobility and the organization of technology with regard to tool manufacturing and maintenance. With respect to lithic tool production, it is also assumed that this relationship should be reflected by attributes of the lithic debitage assemblage found at a particular type of site.

An organization of technology approach is used in this study to examine Middle Woodland settlement and mobility patterns at Clark Lake to "understand the relationships between technology, economic and social strategies, and the environment" (Carr

&Bradbury, 2000, p. 122). At Clark Lake, few stone tools have been recovered from excavations. However, in one area of the site, an abundance of lithic debitage was collected. This debitage provides a basis for making inferences about settlement, mobility and the organization of technology of prehistoric hunter-gatherers.

Research Goals

The research presented here is a thorough and detailed analysis of the flake debris from the Middle Woodland component of a small-scale site at Clark Lake. This includes raw material, flake attribute and mass analysis. "The availability of raw materials suitable for chipped-stone tool manufacture is limited" [in the Mississippi Delta], which makes lithic use strategies a particularly interesting area to study because "it has "great potential to provide significant information about the past and can serve as a critical line of evidence when developing and testing hypotheses concerning prehistoric behavior" (Carr, 2008, p. 201). The present research focuses on the reconstruction of the lithic technological organization at the Clark Lake Site to gain a better understanding of settlement, mobility patterns, and the organization of technology of prehistoric hunter-gatherers in the Mississippi Delta at small-scale Middle Woodland settlements. This research addresses two questions:

1. What type of lithic technological organization was used at Clark Lake?
2. What does the technological organization indicate about the settlement and mobility patterns used by the occupants of Clark Lake?

In addition to the specific questions addressed in this study, the analysis and reanalysis of existing collections of excavated materials is important to the advancement of archaeological knowledge, as new methods and innovative theories about prehistoric behavior are developed, and must be tested because "continued reliance on outdated and demonstrably unreliable methods in the analysis of lithics is unacceptable, and inhibits the growth of the discipline" (Carr, 2008, p. 209).

As shown by Carr and Bradbury (2000), lithic studies in the Southeastern United States do not reflect the advances made and have several fundamental problems, some of which include providing only general lithic data, failure to interpret lithic data in relation to other artifact categories, lack of knowledge of recent literature, and failure to integrate stone tool and debitage data. Oftentimes, in the original reporting and interpretation of an archaeological assemblage, only general analyses are undertaken due to budgets and time constraints, and certain artifacts are counted rather than examined in great detail. This has been shown to be true with lithic assemblages in Mississippi and in the Mississippi Delta (Carr 2008). "Archaeologists must explore every potential data source that is retrievable from the archaeological record because of the difficulty of addressing questions of prehistoric human behavior and behavior change" (Bradbury & Carr, 1995, p. 19). Each artifact, when examined in relation to the other artifacts in the same assemblage, can provide important information, which allows for inferences to be made based upon the recent or current literature of the time and helps to solve unanswered questions and clarify ambiguities.

Thesis Outline

Chapter II presents a synopsis of the various theories pertaining to the development of prehistoric hunter-gatherer settlement and mobility patterns, the organization of stone tool technology, and cultural site formation processes.

Chapter III outlines the various ecological aspects of the study area including geomorphology, flora, fauna, and the availability of raw material.

Chapter IV provides a discussion of the culture history in the Lower Yazoo Basin of the Lower Mississippi Valley.

Chapter V provides a description of the data collection, the analytical methods by which this research was conducted, and expectations for the research. Particular attention is paid to the different methods used in analyzing the assemblage and a detailed explanation of definitions and usage is provided.

Chapter VI presents the results of the data collection and lithic analysis of the Clark Lake assemblage based on the organization of technology utilized by its inhabitants.

Chapter VII contains a discussion and interpretations of the results.

CHAPTER II

THEORETICAL CONSIDERATIONS

"Hunter-gatherers are problems in theory. Because that is so, the future of hunter-gatherer research . . . rest[s] in large part on the extent to which it is grounded in a clear and concise body of theory" because "the facts never speak for themselves" (Bettinger, 1991, p. 213). From these facts, theories are developed to help us understand who we are studying, what they were doing, where they were doing it, why they were doing it, when they were doing it, and how they were doing it. "Until the theory exists, the fact as a scientific phenomenon does not"(Bettinger, 1991, p. 213), and in order that we may be able to better understand the facts (artifacts), theory must form the basis of any anthropological study.

Several of these theories are considered, for the purposes of this research that can provide information about settlement practices and mobility patterns, as well as how these theories relate to how prehistoric hunter-gatherers organized their technology during the Middle Woodland period. This chapter provides an overview of those different theories.

Settlement and Mobility of Hunter-Gatherers

The association of settlement and mobility with hunter-gatherers has a long history. As early as 1651, Hobbes described the natural condition of mankind before "society, government, and the invention of law" as being without culture condemned to wander the land aimlessly living a "solitary, poor, nasty, brutish and short" life (Hobbes, 1651, p. 100). Eventually this model changed from one of aimless wandering to the patterned movement of the seasonal rounds in which the Native Americans exploited their environment to their own ends (Bettinger 1991).

With the advent of the "New Archaeology" and the development of Middle-Range theories, archaeologists began to explain hunter-gatherer societies as functioning adaptive and integrative systems in order to assign "meaning to empirical observations about the archaeological record" (Bettinger, 1991, p. 62). Many people began to define middle-range theory and research in different ways, but regardless of which definition is correct, or how one views middle-range research, one thing is clear, "the underlying framework for much of this research is found in Binford's analytical classification of hunter-gatherer systems" (Bettinger 1991, p. 64).

Residential and Logistical Mobility

Binford's model of residential/logistical mobility is one in which the "availability of natural resources is seen to dictate differing combinations of social, economic, and settlement organization" to "describe a continuum of subsistence-settlement systems with highly mobile foragers at one end and highly sedentary collectors at the other" (Bettinger, 1991, p. 64). Both forms of mobility are responses to the availability and distributional structure of environmental resources, and each type of settlement and mobility pattern manifests itself differently in the archaeological record in regards to site formation processes (Binford, 1980).

With residential mobility, foragers are tethered to sequentially occupied residential base camps. This creates a repetitive pattern of movement as the consumers move their camps to resources. This strategy is characteristic of a relatively homogenous environment where the resources are predictable and storage unnecessary. In contrast, a heterogeneous environment, where resources are unpredictable, may require a different type of settlement system that makes the storage of resources necessary to overcome shortages. Thus, a collector adaptation of logistical mobility resolves the inconsistency, be it through time (seasonal variation of temperature) or space, in the distribution of resources across the landscape by sending out organized task groups, using logistical forays, to move the resources to the consumers (Binford,1980; Bettinger, 1991).

Foragers and Collectors

The foraging adaptation produces two types of sites: residential camps and locations. Residential base camps have the great potential for the buildup of archaeological remains and they are more visible within the archaeological record. They serve as a center point to which inhabitants of a site return after their daily foraging activities. As the carrying capacity of the land within the catchment area of the camp decreases, longer trips are needed to search for food to feed the members of their group. Once resources within the catchment area have been depleted below the point at which relocating makes economic sense, the entire group moves on to another area where the resources are more abundant and the cycle begins again (Binford, 1980).

The second type of site produced by a foraging adaptation is a location. Locations are places where specific tasks are performed, are only occupied for a short time, and do not have the same potential for the buildup of archaeological remains. These types of sites include lithic procurement sites, kill sites, butchering sites, etc. The waste material produced at these sites varies depending on what activity took place at that particular site. The tools used are task specific to the location: they produce very little debris in the way of manufacturing and maintenance, which makes sites more difficult to recognize in the archaeological record.

Along with the residential base camp and the location identified with the foragers, collectors produce three other types of sites "by virtue of the logistical character of their procurement strategies" (Binford, 1983, p.346): field camp, station, and cache. The buildup of archaeological remains at each of these types of sites forms a specific type of patterning within the archeological record that is "differentiated according to the nature of the target resources" (Binford, 1980).

The first type of site is a field camp. A field camp is a temporary operational center where a task group eats and sleeps while away from their residential base camp. It can be distinguished by the different nature of its specific tasks(i.e. fishing, hunting, etc.). "Collectors, like foragers, actually procure and/or process raw materials at locations" (Binford, 1983, p. 346). However, the difference as to whether the site is a location or a field camp that was created by foragers or collectors lies in the amount of debris, which can vary greatly, generated at the location. The second type of site is a station. "Stations are sites where special-purpose task groups are localized when engaged in information gathering" (Binford, 1983, p. 346), such as in the observation of game or other humans, ambush locations, and hunting stands. Lastly, caches are where items, such as raw materials, are stored in anticipation of future use.

Effective Temperature

Effective temperature, as explained by Binford, examines the relationship between seasonal variation of temperature and the distribution of resources and mobility. He argued that hunter-gatherers have no need to store or save resources in spatially and temporally homogeneous environments where resources are abundant and conversely, where there are seasonal shortages in resources, hunter-gatherers adapt their subsistence and settlement practices to overcome these shortages and thus become increasingly more complex. Binford established that where the effective temperature was greater than 15ºC the degree of residential mobility was high, and the need for storage of surplus resources was low. On the other hand, where the effective temperature was less than 15ºC, logistical mobility was high and the necessity for the storage of surplus resources increased. From these observations, he expected, where the temperature was greater than 15ºC a foraging subsistence-settlement system would be implemented, and where the temperature was less than 15ºC a collector subsistence-settlement system would be implemented (Binford, 1980; Bettinger, 1991).

Sedentism

An important topic in North American archaeology today is the origins of sedentism among hunter-gatherers, as sedentism was thought to be in conflict with the foraging way of life (Kelly, 1992). According to Rafferty (1985), the move towards a sedentary way of life is an important development that must not be ignored in any study of hunter-gatherer settlement patterning for three reasons: it either caused or allowed the population to grow rapidly, it led to the development of higher levels of political organization, and it led to the development of agriculture. "Sedentism," in and of itself, is an ambiguous term that has been widely interpreted with regards to settlement permanence or settlement size, and encompasses various settlement forms, making sedentism a relative condition whereby some see sedentism and its emergence as a continuum along a scale of residential mobility (Kelly, 1992; Rafferty, 1985). However, the term that will be adopted for this study is the one used by Rafferty (1985) and given by Rice: "Sedentary settlement systems are those in which at least part of the population remains at the same location throughout the entire year"(Rice, 1975, p. 97). This definition is used because it encompasses all human patterns of movement (i.e., residential/logistical mobility), as well as all types of settlements (Rafferty, 1985).

In the case of mobility, sedentism must be looked at in terms of its economic costs, as there are advantages and disadvantages to sending out smaller subsets of a whole group of people living in one place to collect the resources needed to sustain the entire group, as compared to moving whole groups of people. Among the advantages of sedentism are those not involved in procuring the resources: the young, the old and the infirm would not have to be transported to each new location, it is more energy efficient in that it leads to greater organizational change within a group, and it increases personal security (i.e., accumulation of possessions, comfort, development of hard to transport technologies). One other advantage that begins as a substantial energy cost but over the long-term leads to the conservation of energy is the construction of storage facilities and more, permanent residential structures. Among the disadvantages are increases in the contraction and spread of disease, possible reduction in the variety of diet, and increased boredom and conflict between group members, all of which depend upon the size of the residential unit to a greater or lesser extent (Rafferty, 1985).

Causes of Sedentism

Many archaeologists see sedentism as "emerging slowly along a continuum of residential mobility;" however, others see it as "episodic rather than continuous" because the makeup of the archaeological record cannot definitively show that sedentism developed continuously over time (Kelly, 1992, p. 50). Kelly believes that "in all likelihood, sites produced when people are less residentially mobile will be more visible archaeologically; those produced by an intervening period of high residential mobility will be less visible, and if undated may even be interpreted as special-purpose camps of the sedentary system" (Kelly, 1992, p. 50). Nevertheless, the fact remains that "reductions in residential mobility produce changes in mobility on different levels and scales under different conditions" which, in turn, results in a great deal of variability in what sedentism looks like in the archaeological record. Three basic hypotheses have been developed to try to understand the causes of sedentism as seen in the archaeological record: the "Pull," the "Push," and the social competition hypotheses (Kelly, 1992, pp. 51-54).

The "pull" hypothesis, in trying to explain hunter-gatherer sedentism, states that the presence of abundant resources is necessary and sufficient for the appearance of sedentism because sedentism is a more efficient form of resource procurement, and moving children, the elderly, and the infirm is burdensome and undesirable. This hypothesis is laden with pragmatic difficulties, such as the relationship between sedentism and agriculture. Even though sedentism appears to exist, there may not be any archaeological evidence of such sedentism since agricultural practices appeared before groups became sedentary, and foragers wished to maintain a maximum foraging rate of return by moving their residences, even though it was possible to stay in one place (Kelly, 1992).

Alternatively, the "push" hypothesis, in trying to explain hunter-gather sedentism, states that hunter-gatherers are pushed into sedentism by subsistence stress because resources become scarce, forcing them to intensify subsistence practices because of what Rafferty believes are the three "ultimate causes" (Rafferty, 1985, p. 122) for the development of sedentariness: population growth, environmental deterioration, and territorial restriction (Kelly, 1992; Rafferty, 1985). From these causes, Raffertydeveloped a model of three different types of settlement patterns that come about because of resource stress: non-sedentary settlements, nucleated sedentary settlements, and dispersed sedentary settlements. Each of these will be discussed later.

In contrast to the previous two hypotheses is the social competition hypothesis. In this hypothesis, it has been argued, "sedentism results from the perceived need of intensification" because of social competition through feasting, long-distance trade or other prestige seeking activities, rather than expending the effort to move from one place to the next (Kelly,1992, p. 54). Bender believes that the intensification of surplus food was done to meet kinship and trade obligations and led to the building of storage facilities, which in turn led to the selection of becoming more sedentary (Bender, 1978). However, Rafferty discounts this theory as not being plausible, but rather believes that sedentism led to the development of storage facilities causing the development of kinship and trade obligations (Rafferty, 1994).

In order to understand sedentism, it is important to understand the relationship between residential and logistical mobility. In economic terms, the decision to move to another location or to stay in one place is often dependent upon the rate of return they would receive from the abundance of local resources where they are or where they are moving. This, in turn, can be affected by the cost of moving an entire group of people, rather than one group staying in place and sending out logistical parties, population, and the risk involved in obtaining the local resources. With this in mind, it becomes important to consider how the change to sedentism is recognized in the archaeological record.

Organization of Stone Tool Technology

The models of logistical and residential mobility along with those of curation and maintenance, which will be discussed later, are key to understanding lithic assemblage formation as related to hunter-gatherer mobility and organization of technology. The models of lithic assemblage composition that are generated under the different mobility strategies rely on three interrelated sets of factors to determine the costs and benefits that arise from the manufacture or maintenance of stone tools. The first factor is the quality of resources exploited by a population to manufacture and maintain tools. The second factor is raw material availability and how this affects the reduction strategies for manufacturing tools. The last factor is the type of mobility being practiced. "The nature of the resources exploited determines the need for efficiency in procurement" and technology can improve efficiency by reducing the time, energy and risk involved in procurement of suitable raw material needed for the manufacture and maintenance of stone tools (Lurie, 1989, p. 47)

A high degree of mobility affects stone tool technology in three ways: it should place constraints on technology by imposing a *carrying cost*, it may restrict the time invested in the manufacture of tools, and raw materials are more easily procured when access is not restricted and procurement is embedded in basic subsistence practices (Binford, 1979; Lurie, 1989; Shott, 1986). Thus, with residential mobility, there is an increase in generalized tool types because the number and size of tools that can be carried between residences is limited. Conversely, it stands that if with residential mobility or high degree of mobility, technological diversity declines and the versatility of tools increases, then with logistical mobility or a low degree of mobility, technological diversity increases, and the versatility of the tools decreases because different logistic moves are likely to have different purposes necessitating the need for more functionally specific or specialized tools (Shott, 1986).

Nelson states, ". . .the concept of technology as strategy to understand variation across assemblages according to different uses of places and different plans" has been in use since Binford first posited the idea (Nelson, 1991, p.58). Strategies are sets of human behaviors used to solve problems in response to environmental conditions across time and space. These strategies help humans to adapt to the changing environment in order to overcome stresses; however, this does "not account for all technological behavior or all formal variation in tools, weapons, and facilities" (Nelson, 1991, p. 59). The organization of technology is a conditional response to environmental stresses such as resource predictability, resource distribution, resource reproduction, amount of resources available, size and patchiness of resource areas and potential risks involved (Binford, 1978a, 1980; Nelson, 1991). These impediments are problems to be solved, using sensible strategies, to achieve the maximum returns on investments of time and energy so that carrying costs and risk may be reduced (Bamforth, 1986; Binford, 1978a, 1978b; Bleed, 1986; Kelly, 1992; Nelson, 1991; Torrence, 1989).

For many years archaeologists have measured the size of prehistoric foraging areas and varying degrees of mobility through the distribution of stone tools relative to the area of raw material procurement (Kelly, 1992). However, more recently, archaeologists have tried to reconstruct mobility by examining the organization of stone tool technologies through the use of flake attribute analysis and mass analysis to "understand the relationships between technology, economic and social strategies, and the environment" (Carr & Bradbury, 2000, p. 122).

Characteristics of Stone Tool Technology

Diverse site types result from the different technological organizations of the various modes of settlement-subsistence systems. The different mobility strategies of hunter-gatherers produce a wide range of physical characteristics distinctive in stone tool technology. From this, inferences about the settlement and mobility patterns of hunter and gatherers can be made from the analysis of debitage produced by different end goals of stone tool manufacturing.

According to Binford (1979), tool assemblages exhibit various characteristics based upon procurement, manufacture, maintenance, and use. His observations of Nunamiut technology characterized a "well developed storage and caching strategy" for active and passive gear, "such that at any one time some of the [technology-organized] gear" is either being actively used during the present time, or passively stored until needed, usually the next season, or to insure its use in the future at a specific site (Binford, 1979, p. 256). This caching helps to modify the environment by distributing necessary resources in anticipation of future needs.

In anticipating future needs of necessary resources, an embedded form of procurement is practiced because hunter and gatherers seldom make special trips to gather raw material. They would rather combine the gathering of raw material with subsistence activities such as hunting, fishing, or foraging in the area where the raw material is present in order to reduce the amount of time and energy expended on collecting the raw material (Binford, 1979).

From the technological organizational perspective of the Nunamiut, Binford distinguished three types of field gear used in their planned execution of subsistence strategies: personal gear, site furniture, and situational gear. Personal gear includes tools that are anticipatory in nature, selected in terms of what the goals of an expedition are for, hunger and warmth, and potential mishaps. These tools are highly curated and are represented in the archaeological record as worked cores, knives, projectile points, and hammerstones (Binford, 1979). Site furniture consists of items that are left at a particular site because their utility is specific to that location. They are anticipatory in nature, as well, since they vary in function depending upon the needs of the site's occupants. They can be either curated or expedient and remain at the site or be moved to another site to be utilized there (Binford, 1979). The last classification type is situational gear. Situational gear are tools that are "gathered, produced, or 'drafted into use' for purposes of carrying out a specific activity" in response to certain conditions rather than in anticipation of events or situations (Binford, 1979, p. 264). These types of tools are expedient in nature and are represented in the archaeological record most often as utilized flakes.

Curated and Expedient Tools

An important aspect of the technological organization, according to Binford (1978a, 1978b, 1979), and one that is used extensively as a way to explain site formation processes and settlement adaptations is the relative frequencies of curated and expedient tools. Curated tools are tools that are manufactured in anticipation of use, maintained to extend usage, transported from place to place for use, and recycled for another type of use when no longer needed for their primary purpose (Bamforth, 1986; Binford, 1978a, 1978b, 1979; Odell, 1996).

Hunter-gatherers have two problems, time stress and raw materials, which, according to Carr (1994), can be alleviated by curated tools because the tools are manufactured before they are needed in anticipation of their future need. Curated tools, according to Binford (1978a), are linked to logistical mobility and a collector adaptation due to the planned nature of logistical activities and should reflect the planned expectations of future task-specific goals associated with logistically organized efforts. Curation ensures that tools will be available when needed which solves the problem of the lack of raw material or limited time frame at the location where they are to be used (Carr, 1994).

On the other hand, expedient tools are tools that are manufactured, used, and then discarded according to the needs of the moment, and very little time is invested in their manufacture (Bamforth, 1986; Binford, 1978a, 1978b, 1979). The tools are manufactured at the time and place of need for use. The example used by Nelson to explain this is the stockpiling or transporting of prepared cores in order to make tools as they are needed. The change in form of the objects is the difference between tools being either curated or expediently used (Nelson, 1991).

Expedient tools have been linked to a foraging adaptation, as well as sedentism. Ethnographic accounts of expedient core technology share three characteristics: flaking technique does not control the shape or form of flake, no distinction is made between tools or waste, and the tools are seldom modified (Parry & Kelly, 1987). However, according to Nelson (1991), there is a fine line between expedient and curated tools, as expedient tools can often become curated instead of being abandoned. Expedient tool technology or situational tool organization is often associated with a forager adaptation with relatively high residential mobility (McCarty-Fields, 2001). Expedient tool technology, which is often linked to residentially mobile hunter-gatherers, is also employed by logistically mobile hunter-gatherers and is dependent upon the availability of raw material and tool needs (Carr, 1994; Parry & Kelly, 1987) "in response to conditions, rather than put together in anticipation of events or situations" (Binford, 1979, p. 266).

According to William Andrefsky (1994), the availability of raw material must first be considered when linking stone-tool production with prehistoric settlement configurations and mobility because the availability and quality of the raw material determine the types of tools being manufactured. Informal tools tend to be manufactured from poor quality raw material. Formal tools tend to be manufactured from high quality raw material in low abundance and both formal and informal tools are manufactured when high quality material occurs in high abundance. "Several [other] variables must [also] be considered when looking at raw material and its implications. They include, but are not restricted to, the degree of mobility, procurement tactics, environmental changes, and social interactions among various groups" (McCarty-Fields, 2001, p. 32).

As Parry and Kelly (1987) suggest, mobility plays an important role in the manufacturing of stone tools since it dictates the tool needs and access to raw materials. The composition of raw material represented in an assemblage can be considered an indication of the type of procurement strategy used and the degree of mobility. If an assemblage is heterogeneous in nature, consisting of an abundance of non-local material, it is suggestive of a more mobile population. If an assemblage is homogeneous in nature, consisting of an abundance of local raw material and little non-local material, it is suggestive of a more sedentary population. The dominance of local material in stable, sedentary settlements maybe moderated by exotic material acquired through trade networks established among neighboring groups.

A shift toward sedentism, according to Parry and Kelly (1987), affects the organization of stone tool manufacturing by causing the technology to become more expedient. They based this conclusion on studies that reflect a shift from standardized core technology used to create flat, prepared cores with well-shaped platforms to an unstandardized core technology used to create expedient flakes from amorphous cores (Parry & Kelly, 1987). This shift, however, did not cause one technology to be replaced by another, nor did it come about because of local conditions such as climate, topography or vegetation, technological innovations, or the introduction of agriculture, but because of changing settlement patterns and the first occupation of permanent villages. It could have also come about as a result related to the environmental location of a particular group given the availability of raw material within the usable foraging area. If raw material is available within the usable foraging area of the residence, there is no need for tools to be formally shaped in anticipation of what will be needed in the future. A result of the restricted mobility range is that sedentary groups should be expected to rely on more informal, expedient types of tools rather than formal, curated tools (Parry & Kelly, 1987).

Despite the fact that models of hunter-gatherer mobility predict an emphasis on expedient tool technology, there are situations where the distribution would promote a greater reliance on curated tools. Kelly (1988) states, “as raw material becomes more scarce, or of poorer quality, foragers must put more effort into the production of tools designed to overcome the spatial differences between raw material and activity locations”

(Kelly, 1988, p. 719). With this in mind, Kelly concluded, under these conditions, residentially mobile foragers should produce large bifaces that would serve as tools, as well as cores that would be used to manufacture other tools, thus reducing the carrying cost if high quality raw material was located a considerable distance from their site. Alternatively, sedentary groups should extensively depend on un-retouched, expedient flake tools because formal, curated tools are more useful in a residentially mobile settlement system.

Mobility, Trade, and Exchange

Trade and exchange is defined as the reciprocal movement of goods between individuals or groups of people. Within the archaeological record, however, it is only the movement of goods that can be discerned from the artifacts recovered. Finding the source of these artifacts is but one factor, among many, to consider when trying to make inferences about mobility from what is represented in the archaeological record. Other factors include procurement, transport, manufacture, use, recycling, and disposal. While this description may make the understanding of trade seem simplistic, it is actually quite complex and many different models and theories have been developed in order to understand this phenomenon. Nevertheless, while explanations of prehistoric trade systems and conditions may change, determining the source of trade items will always demonstrate indirect contact existed between individuals and places.

Within Southeastern studies, there is not “a [clearly] unified theory of trade” or exchange (Johnson, 2010, p. 116). Early trade models emphasize redistribution and social organization and the spatial implications of redistribution. Later models look at trade as a way of maintaining social ties and interactions, as a way of transmitting information between neighboring hunting-gathering groups, and as a way of maintaining the status hierarchy (Johnson, 2010). From these models, one central idea can be inferred: the ultimate goal is to ascertain a cultural account for these goods beginning with the procurement of raw materials and ending with their disposal. Included in this consideration is the distribution of raw materials and how distribution affects the nature of technology concerning mobility and access to trade, as each will produce a different outcome within the archeological record.

The implications of trade versus mobility are critical to understanding the archaeological settlement patterning of prehistoric hunter-gatherers. As stated previously, the availability and use of raw material is an important factor to consider when looking at settlement and mobility, and the degree of mobility is an important variable in this. An increase in sedentism causes a reduction in mobility range; the causes, which were discussed beforehand, may be due to the increase in the population levels of certain groups living in the resource area of a particular raw material. In order to adapt to this restriction, long distance trade networks and exchange systems may have been developed.

Cultural Site Formation Processes

For a great many years, site structure has been a topic of interest for archaeologists, as artifacts and features are never randomly scattered throughout a site. The frequency and density of artifacts can dramatically vary from one area to the next, which can be attributed to the archaeological patterning of segregated activities of the inhabitants of a site (Metcalf & Heath, 1990).

While this interpretation can be used to explain a primary refuse deposit of material discarded at the location of manufacture or use, it cannot be used to interpret secondary refuse deposits of material discarded at a place completely different from where it was manufactured or used. The distinction between primary and secondary refuse, first noted by Michael Schiffer (1972), was the beginning of ethno-archaeological research into the factors of refuse disposal at a site.

The spatial structures of artifact distribution is useful for delineating possible activity areas in cases of primary refuse deposit at the location of manufacture or use, but an interpretation can be confounded by deposits of secondary refuse discarded at a place completely different from where it was manufactured or used. A number of factors affect the likelihood of secondary refuse disposal including the size of refuse, as well as the length of site occupation. Small-sized items are more likely to be primary refuse, whereas larger items are more likely to become secondary refuse. This pattern is affected by the duration of site occupation. A temporary stay at an overnight camp would be more likely to produce primary refuse that would otherwise be cleaned up at an extended stay camp or village. To relate these generalizations to the distribution of debitage in a site, lithic activity areas can best be identified by the macro-and micro-debitage found. If only micro-debitage is found in an area, it is considered primary or defacto refuse, whereas areas with large amounts of macro-debitage and no micro-debitage are considered secondary refuse lithic disposal areas (Hull, 1987). This model's predictions are obviously affected by non-cultural factors such as wind and erosion.

Although flakes are considered small items, the manufacturing of stone tools can produce a large aggregation of small flakes, which would increase the likelihood of discard in secondary locations. Investigations of these large aggregations of flakes would be useful in examining the refuse disposal techniques of prehistoric inhabitants of small-scale Middle Woodland settlements because refuse disposal is "an important activity for structuring the distribution of . . . artifacts at a site" (Metcalf & Heath, 1990, p. 783). Useful to these investigations would be the ability to predict the types of cleaning activities that took place at a site to effectively assess the size sorting effect found in the various contexts of the site. In contemporary ethnographic studies "it has been demonstrated that among modern hunter-gatherers and in simple agricultural/pastoral societies a wide variety of cleaning techniques are employed, ranging from scooping out the contents of hearths, to sweeping, raking and manually tossing items of refuse from activity areas" (Metcalfe & Heath, 1990, p. 783). "Placing, unlike dropping or tossing, concentrates refuse in a small area in the immediate activity" area and tends to generate clustered primary refuse deposits which are more likely to be thrown into a more permanent refuse deposit (Tani, 1995, p. 236). Secondary refuse deposits are created by a range of dumping and area maintenance activities and range in size from what Binford identifies as "door dumps" to extremely large modern landfills. These small door dumps, which represent waste that is generated inside structures, are formed just outside its entrance, and are common among people who are more sedentary (Binford, 1983, p. 165, Tani, 1995, p. 237).

Summary and Conclusions

Bettinger states, "the theories of anthropology have been shaped in fundamental ways by hunter-gatherers" and that the field of anthropology arose "primarily in response to direct encounters with primitive peoples" (Bettinger, 1991, p.2). It is through these attempts that the basis of ethnographic studies was formed, and from these ethnographic studies, many different theories have been developed (Bettinger, 1991). In the study of prehistoric hunter-gatherers, archaeologists, in one way or another, have always relied on the ethnographic record to develop different theories in an attempt to understand hunter-gatherer lifeways. However, it has been argued that "archaeologists must not project patterns of behavior derived from ethnographies into the past but rather must explore the variability of prehistoric hunter-gatherer behavior" (Bradbury & Carr, 1995, p. 100) through the investigation of settlement and mobility patterns, as well as the organization of technology, to construct theoretical models and develop the framework necessary in order to answer the questions that are being asked by archaeologists about hunter-gatherer lifeways.

CHAPTER III

GEOGRAPHIC AND ENVIRONMENTAL SETTING

This chapter gives an overview of the distinctive environmental characteristics, as well as the natural environmental structure of the area under study, that helped to influence the adaptive strategies and behaviors of the prehistoric Native Americans living at Clark Lake in the Mississippi Delta.

Environmental Setting

Physiography and Geography

Mississippi is part of the Coastal Plain that stretches from Virginia to Eastern Texas along the Gulf Coast (Figure 1). The Lower Mississippi Valley (LMV) stretches south from Cairo, Illinois to the Gulf of Mexico and is approximately 80-110 km wide by 1600 km long (Figure 2) (Stout & Marion, 1993). Mississippi, by itself, is divided into nine physiographic regions. The physiographic region referred to as "the Delta is one of the nine regions and covers approximately 7000 square miles in all or parts of 19 counties in northwestern Mississippi" (Figures 3-4) (Mooney, Wilkerson, Mead, & Wilson, 2004, p. 7). It is marked by "level to undulating areas near the Mississippi River and around abandoned and extinct river channels" (Stewart, 2003, p. 3). Formed during the quaternary age, "the soils of the delta are a dark rich alluvium, composed of sand, silt and clays" (McLemore, 1973, p. 8). Based upon the separating power of the water, as well as the age of the materials, the soils can be divided into three main types of bottom soil: sandy silt loams of the natural levees, older meander belts with some clay content, and poorly drained back swamp deposits with extremely high clay content (McLemore, 1973; Mooney et al., 2004; Stout & Marion, 1993). "These soils are fertile but poorly drained,

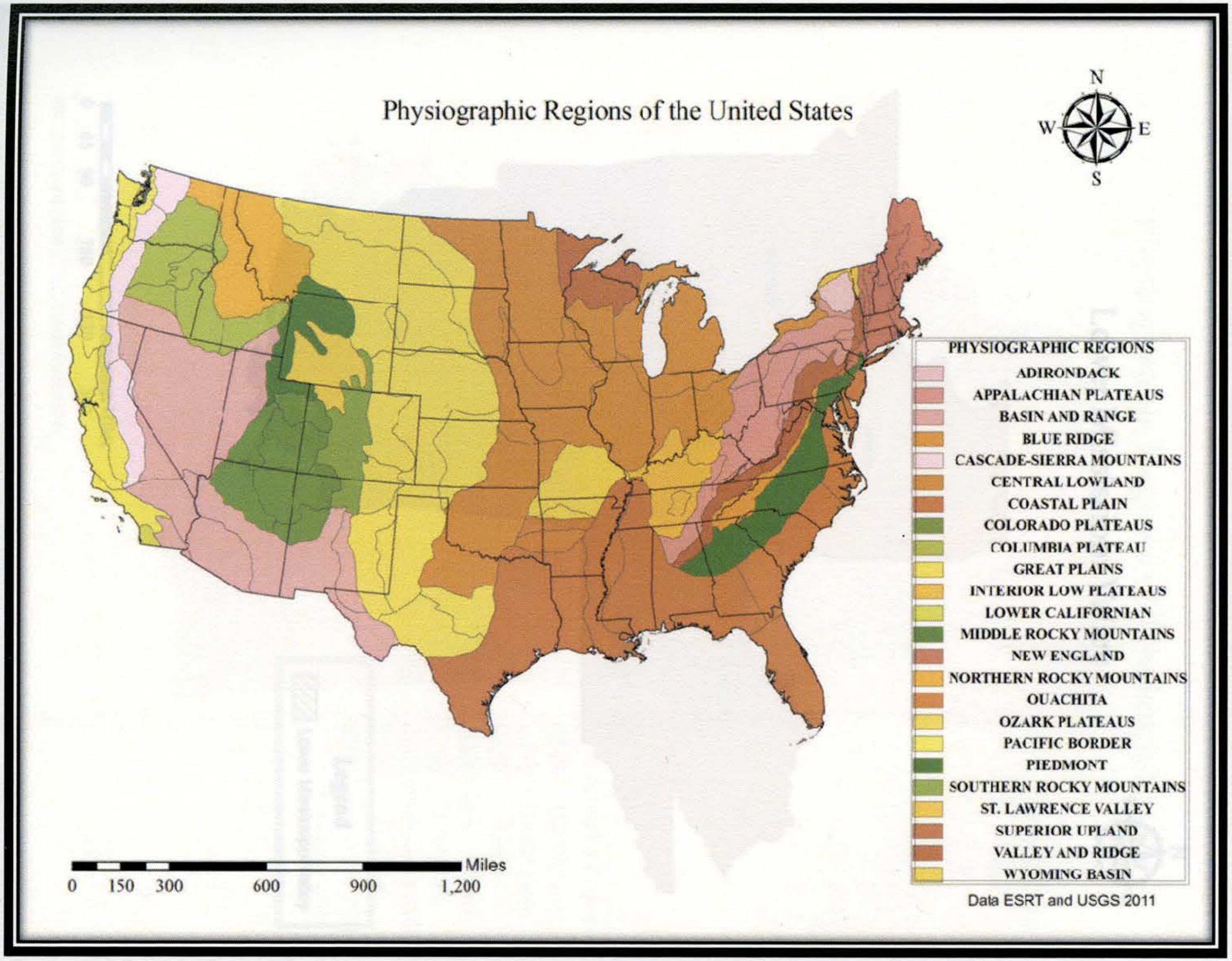

Figure 1. Physiographic Regions of the United States.

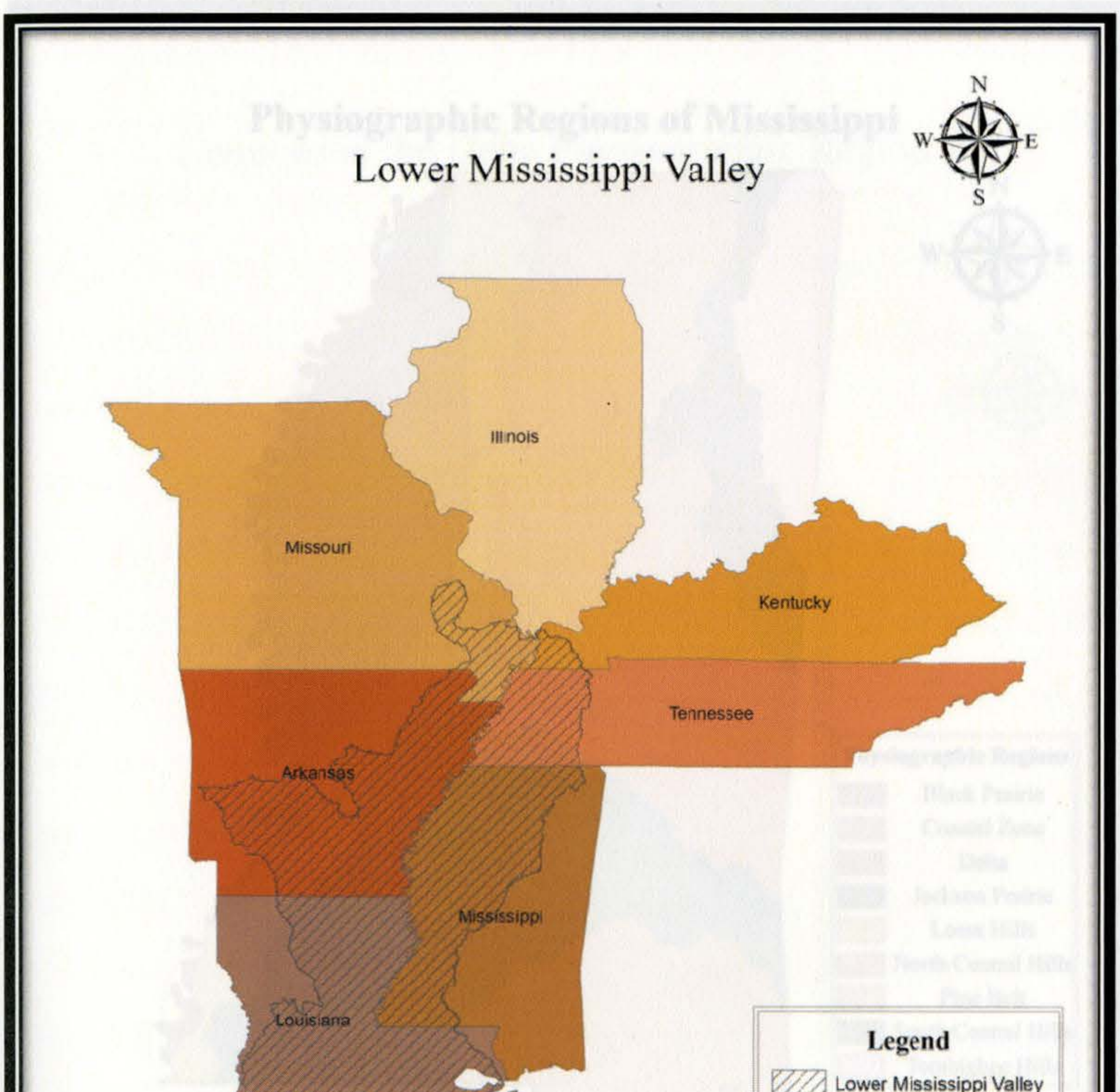

Figure 2. Lower Mississippi Valley.

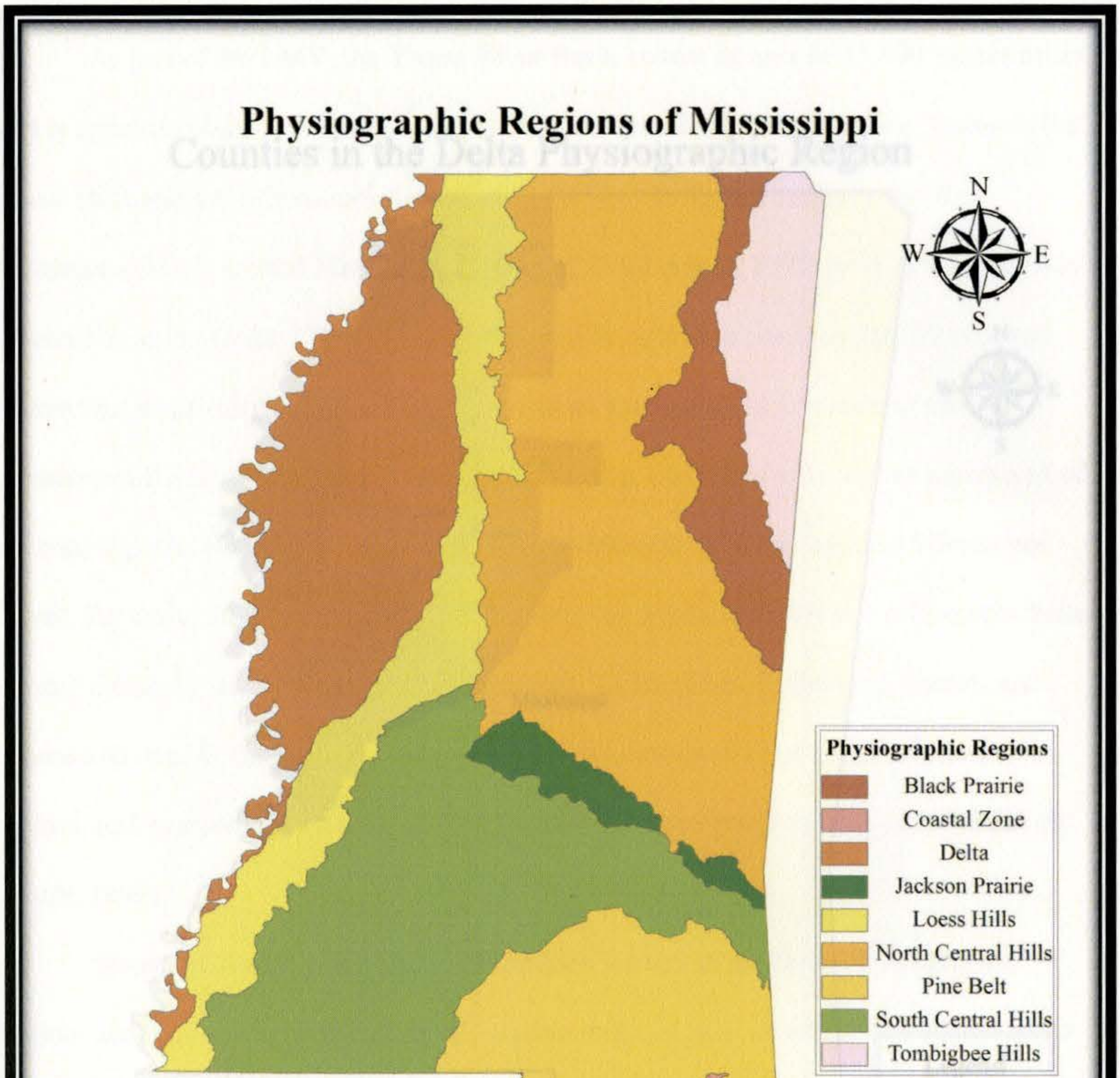

Figure 3. Physiographic Regions of Mississippi.

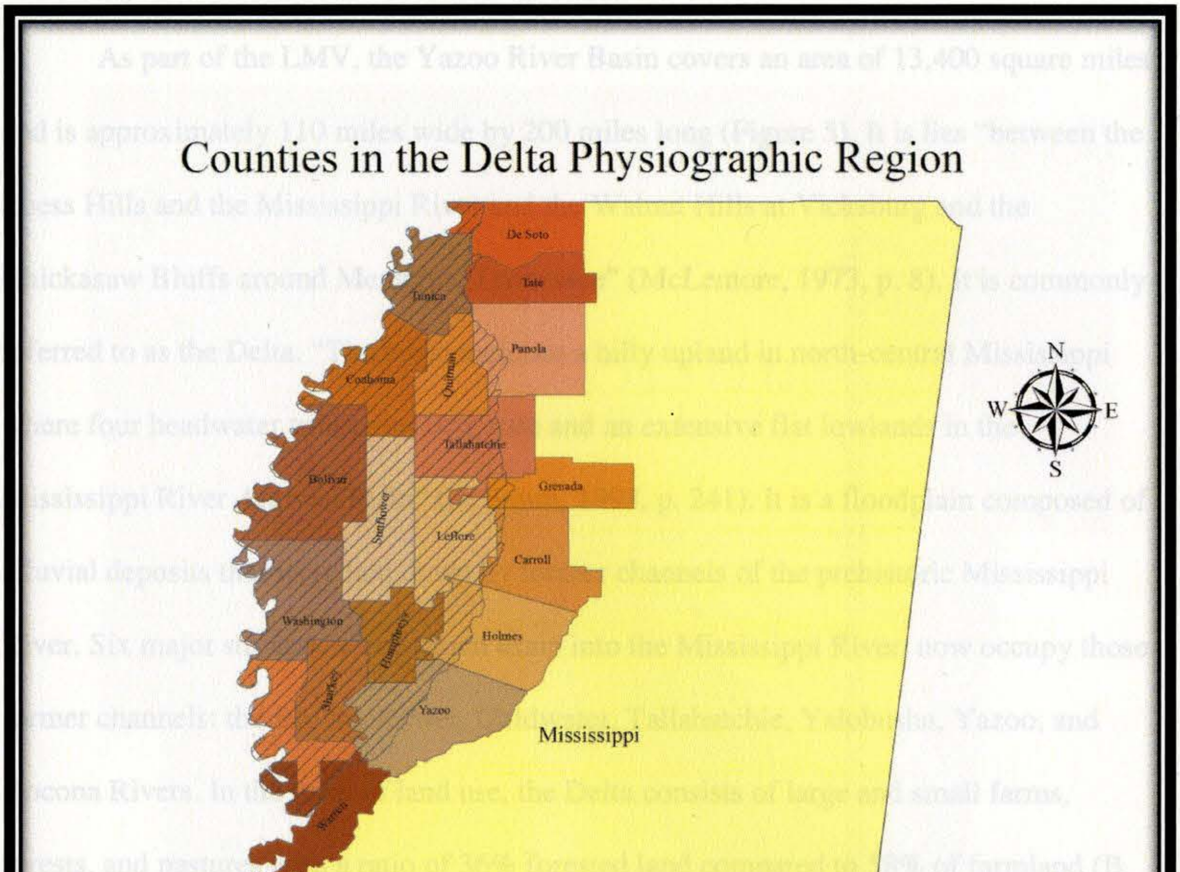

Figure 4. Counties in the Delta Physiographic Region.

and in dry weather become granular" (McLemore, 1973, p. 8). This granularity of the dry soil is why the soil has been referred to as buckshot.

As part of the LMV, the Yazoo River Basin covers an area of 13,400 square miles and is approximately 110 miles wide by 200 miles long (Figure 5). It is lies "between the Loess Hills and the Mississippi River and the Walnut Hills at Vicksburg and the Chickasaw Bluffs around Memphis, Tennessee" (McLemore, 1973, p. 8). It is commonly referred to as the Delta. "The basin includes a hilly upland in north-central Mississippi where four headwater tributaries originate and an extensive flat lowlands in the Mississippi River Alluvial Plain" (B. Smith, 1998, p. 241). It is a floodplain composed of alluvial deposits that were laid down by former channels of the prehistoric Mississippi River. Six major streams, all of which drain into the Mississippi River, now occupy those former channels: the Big Sunflower, Coldwater, Tallahatchie, Yalobusha, Yazoo, and Yocona Rivers. In the form of land use, the Delta consists of large and small farms, forests, and pastures with a ratio of 36% forested land compared to 58% of farmland (B. Smith, 1998).

Sharkey County is one of the 19 counties located in the Delta physiographic region, and it covers approximately 435 square miles of area, of which 428 square miles are land, and seven square miles are water (Figures 4 & 6). The county is located within the confines of three watersheds, and nine different types of soil classifications have been identified (Figures 7-8) (Table 1).

The Delta National Forest is located in Sharkey County within the floodplain of the Mississippi River (Figure 6). It was established as a National Forest on January 12, 1961 under Secretary of Agriculture Order 26-FR 627 (Davis, 1983). It is a large,

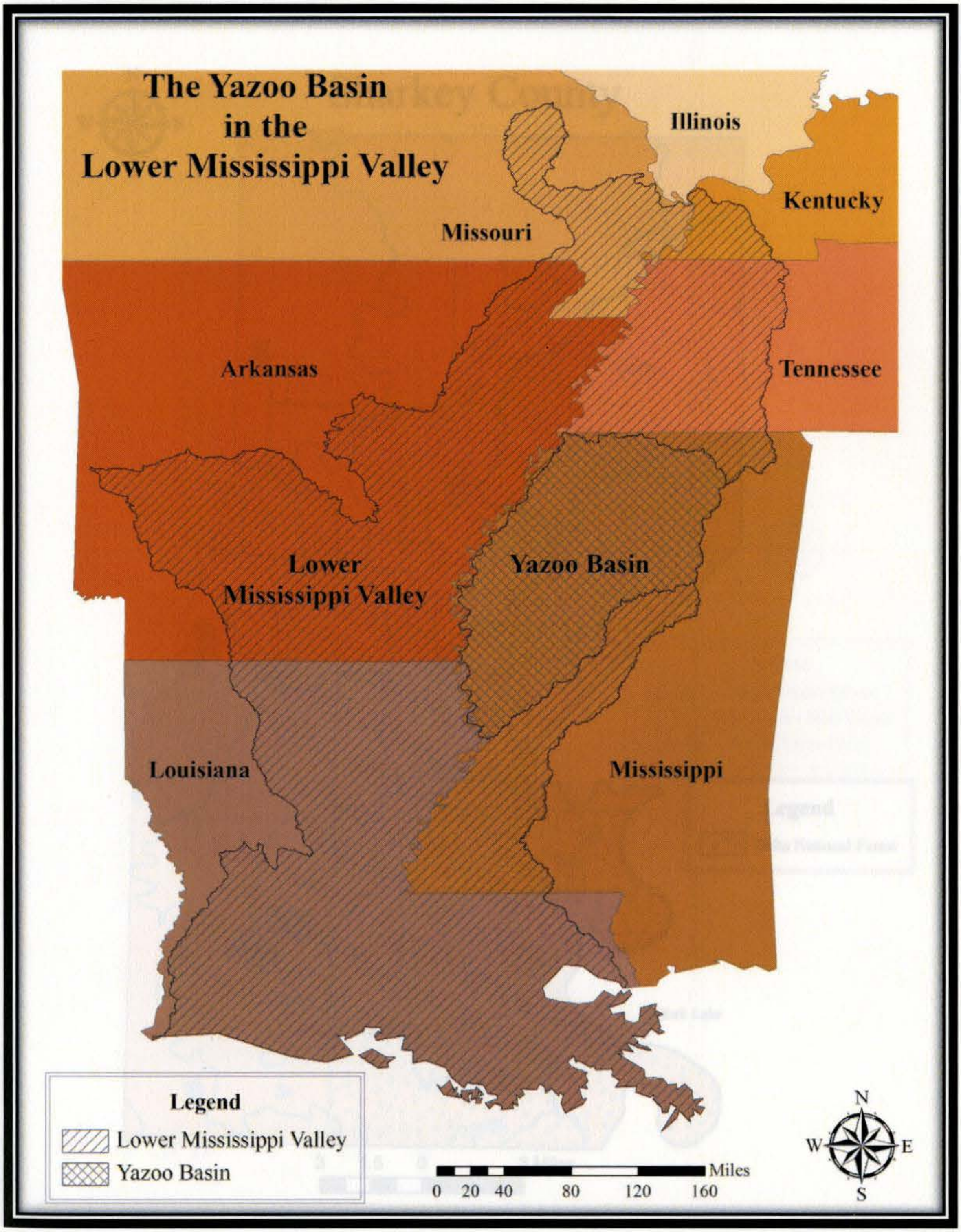

Figure 5. The Yazoo Basin in the Lower Mississippi Valley.

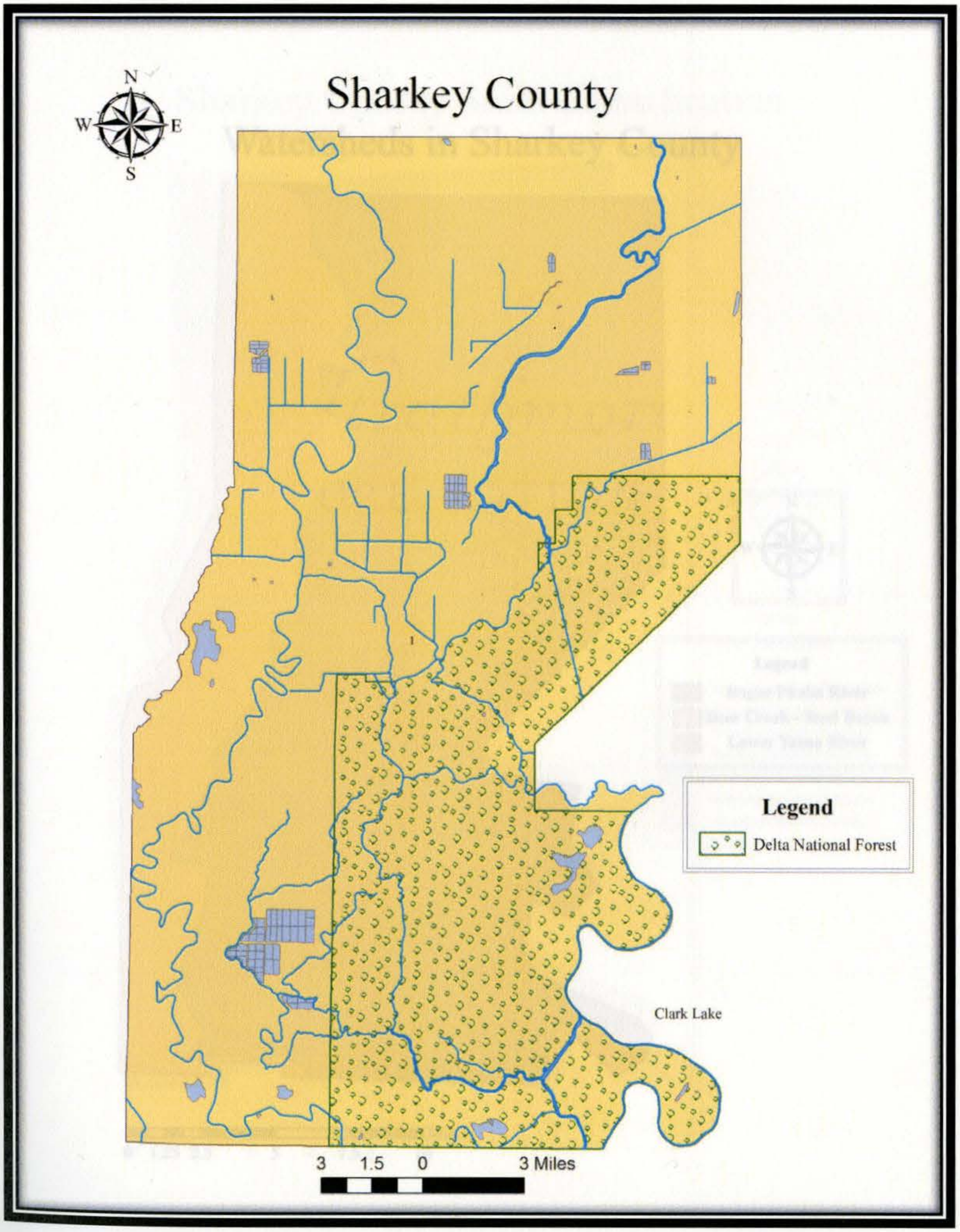

Figure 6. Sharkey County.

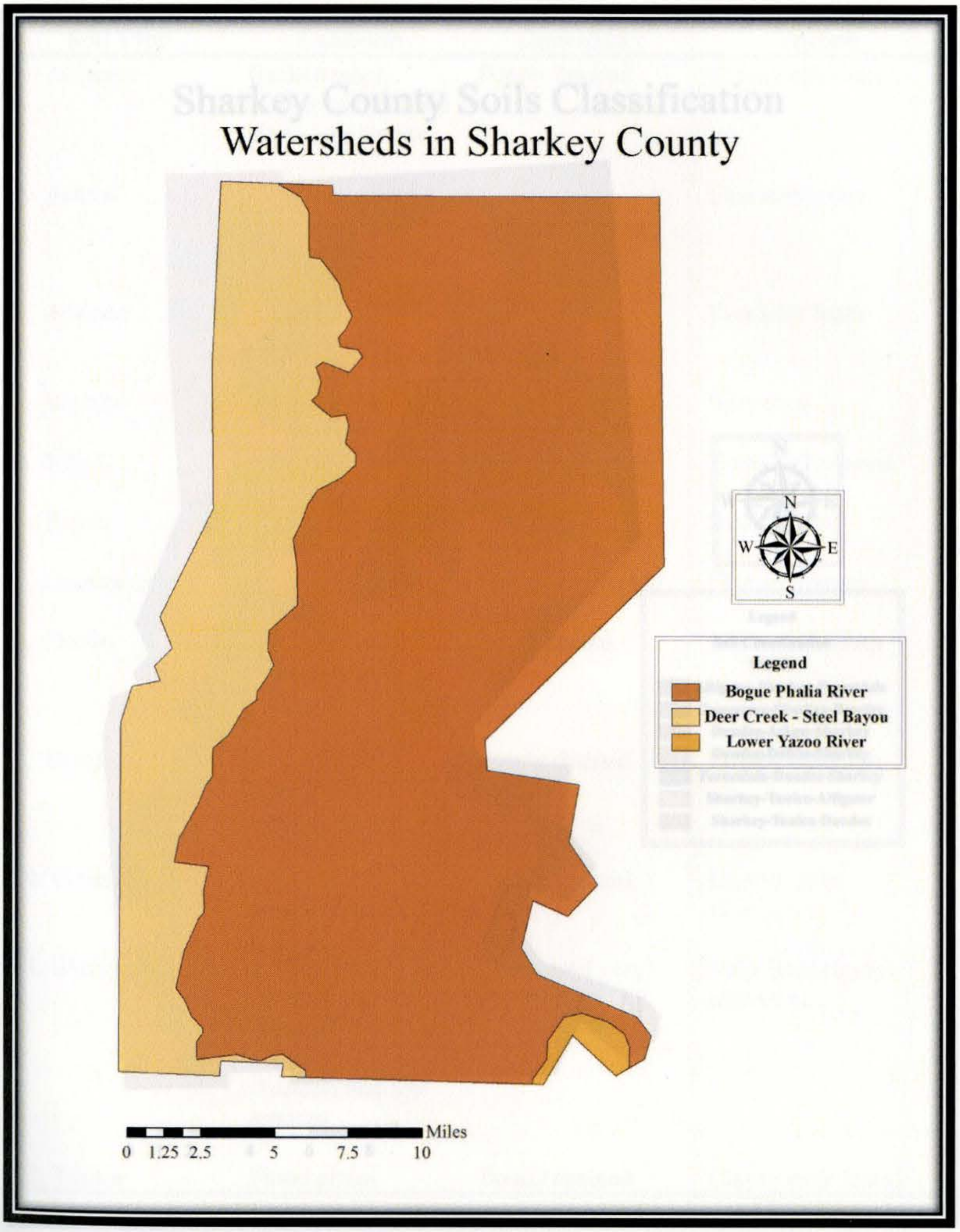

Figure 7. Watersheds in Sharkey County.

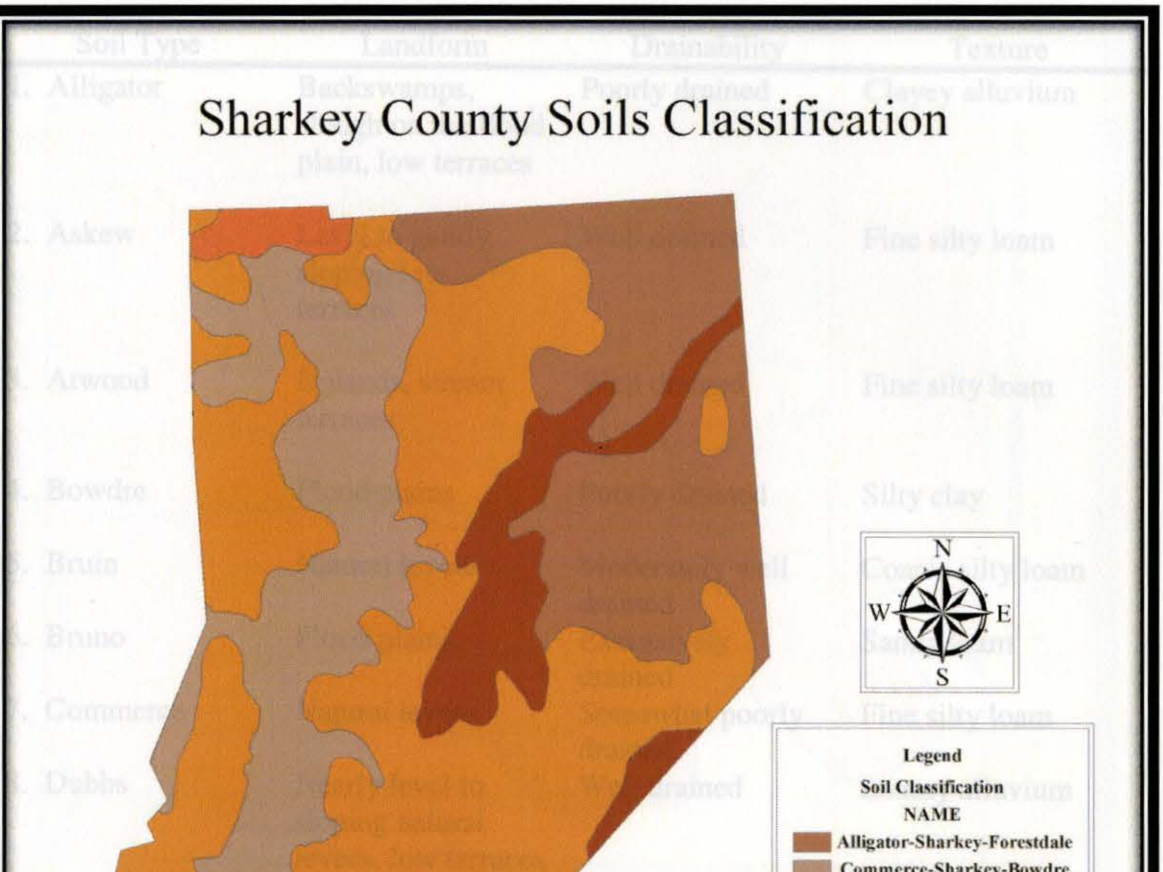

Figure 8. Sharkey County Soils Classification.

Table 1

Sharkey County Soil Types

Soil Type	Landform	Drainability	Texture
1. Alligator	Backswamps, slough on the flood plain, low terraces	Poorly drained	Clayey alluvium
2. Askew	Level to gently sloping low terraces	Well drained	Fine silty loam
3. Atwood	Uplands, stream terraces	Well drained	Fine silty loam
4. Bowdre	Flood plains	Poorly drained	Silty clay
5. Bruin	Natural levees	Moderately well drained	Coarse silty loam
6. Bruno	Flood plains	Excessively drained	Sandy loam
7. Commerce	Natural levees	Somewhat poorly drained	Fine silty loam
8. Dubbs	Nearly level to sloping natural levees, low terraces	Well drained	Loamy alluvium
9. Dundee	level to gently sloping natural levees, low terraces	poorly drained	Loamy alluvium
10. Forestdale	Low terraces, natural levees	Poorly drained	Clayey, silty alluvium
11. Sharkey	Flood plains, natural levees in backswamps and abandoned channels and low terraces	Poorly and very poorly drained	Very fine, clayey alluvium
12. Tunica	Flood plains	Poorly drained	Clayey over loamy

Based upon the USDA Soils Classification

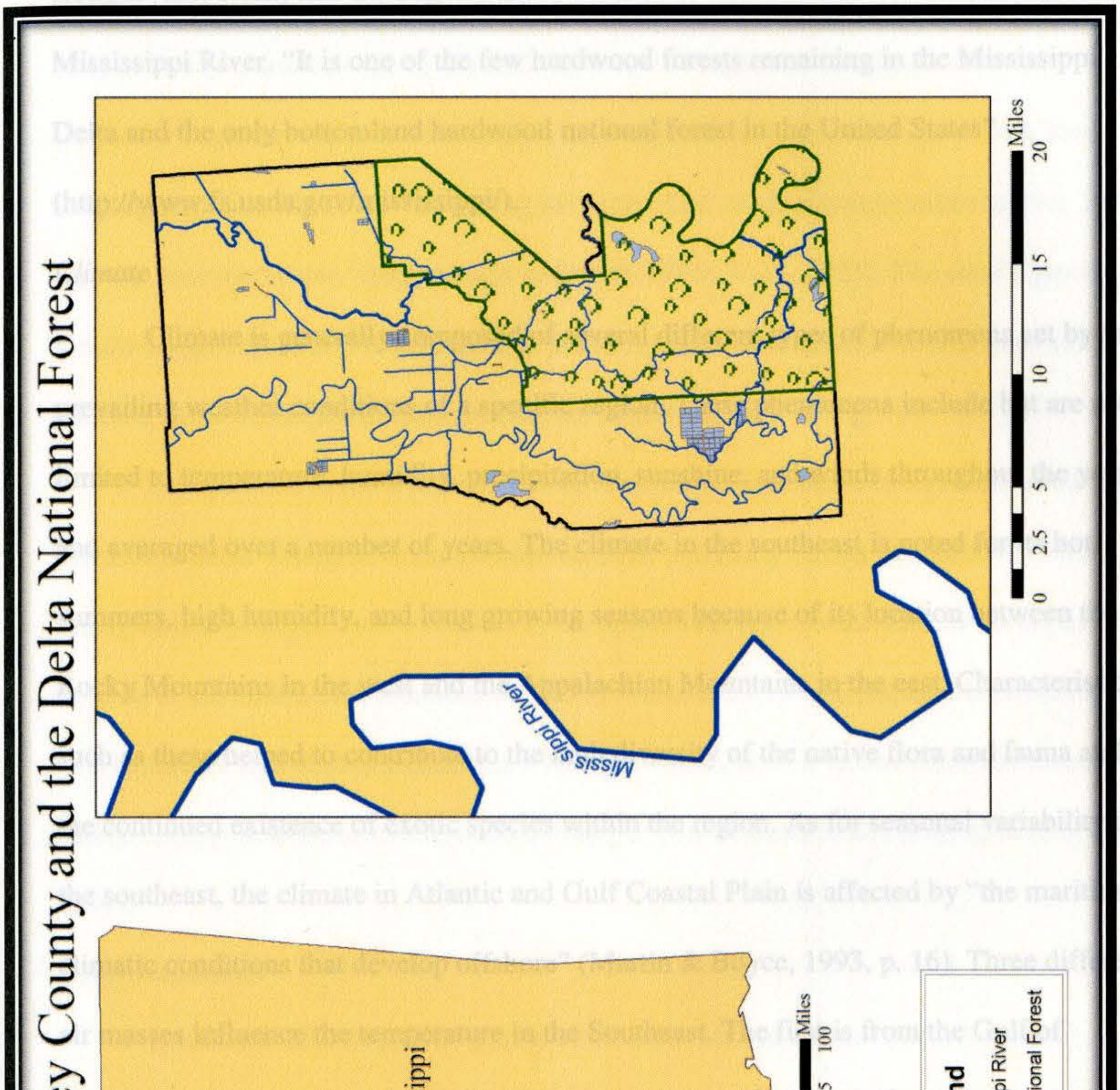

Figure 9. Sharkey County and the Delta National Forest.

contiguous block of bottomland hardwood forest, seasonally flooded timber, and small sloughs [that drain] into the Big and Little Sunflower Rivers in the Yazoo Basin of the Mississippi River. "It is one of the few hardwood forests remaining in the Mississippi Delta and the only bottomland hardwood national forest in the United States" (http://www.fs.usda.gov/mississippi/).

Climate

Climate is generally composed of several different types of phenomena set by the prevailing weather conditions of a specific region. These phenomena include but are not limited to temperature, humidity, precipitation, sunshine, and winds throughout the year and averaged over a number of years. The climate in the southeast is noted for its hot summers, high humidity, and long growing seasons because of its location between the Rocky Mountains in the west and the Appalachian Mountains in the east. Characteristics such as these helped to contribute to the high diversity of the native flora and fauna and the continued existence of exotic species within the region. As for seasonal variability in the southeast, the climate in Atlantic and Gulf Coastal Plain is affected by "the maritime climatic conditions that develop offshore" (Martin & Boyce, 1993, p. 16). Three different air masses influence the temperature in the Southeast. The first is from the Gulf of Mexico which it is warm and moist. This air mass controls summertime weather patterns, and it reduces the impact of cold air from Canada during the winter. The second is "the Gulf Stream that affects the entire Atlantic Coast and westward to the southern Appalachians" (Martin & Boyce, 1993, p.16), and the third is the air masses that flow down from Canada during the winter (Martin & Boyce, 1993; Ward, 1925).

During the spring through the fall in the Southeast, temperatures can often reach highs of 90-100º F, or more, for short periods of time. Winters are mild with short periods of freezing temperatures that can often reach lows of 20-30° F. The growing season begins around mid-March and continues until around mid-November; however, this can be split into two seasons due to the limiting factor of high heat during the summer (http://www.garden.org/). In Mississippi, the temperature ranges from 42° F with some freezing days that dip below 32° during the winter and reaches temperatures to over 100° F in the summer(Foster, 1869; Martin & Boyce, 1993; Ward, 1925). The state's growing season "ranges from 200 frost-free days in the extreme Northeast . . . to 270 days along the Gulf Coast from March through October" (McLemore, 1973, p. 10).

Precipitation in the Southeast is well distributed with some exceptional years that resulted in either droughts or remarkable rainfall, especially during the summer months. Precipitation averages from 40 inches in the upper Southeast to amounts in excess of 100 in. around the Gulf States (McLemore, 1973; Ward, 1923). The Southeast is noted for its fairly frequent and intense rainstorms with high winds, as well as some thunderstorms. In Mississippi, precipitation averages 56 inches per year (United States Geological Survey, 1994).

Lithic Resources

Prehistoric hunter-gatherers used stone tools for a variety of purposes from hunting and preparing food to butchering animals and building. They learned early on that different types of rocks were better than others for the manufacturing of stone tools. "These turned out to be high-silica rocks that broke with a conchoidal fracture" since they "are not easily weathered away, nor mechanically decomposed during erosion" (Rapp, 2009, p. 70). Many prehistoric groups gathered both ground-stone and chipped-stone raw materials from riverbeds, secondary deposits of boulders, or even from petrified wood.

Ground-stone tools are made by grinding stone into the preferred shape, first by slowly pecking or flaking the surface of the stone, then by rubbing it on a slab of gritty rock such as sandstone, and finally by polishing the surface by rubbing it with a finer-grained rock such as fine, loose sand. It is a slow and laborious process; however, the tools are usually strong. Ground-stone tools are usually made from granite, basalt, rhyolite, andesite or other types of igneous rock. These types of rocks are ideal for grinding other materials because of their course grain structure and silica content. The types of tools made from these types of rocks typically consist of mortar and pestles or manos and metates, adzes, celts, axes, hammerstones and boatstones(Andrefsky, 2005; Peregrine, 2001; Rapp, 2009).

Chipped-stone tools are made by removing flakes of stone from a core or preform through hard hammer or soft hammer percussion or pressure flaking. Chipped stone tools are usually made from cryptocrystalline or microcrystalline materials such as chert, flint, quartz, chalcedony, novaculite, quartzite, felsite, or obsidian. The types of tools made from these types of rocks typically consist of projectile points, knives, drills, burins, scrapers, or blades.

In Mississippi, "gravel aggregate and sand are the most naturally occurring building material" (Russell, 1987, p. 1). This gravel aggregate underlies much of the state; however, some regions do not have access to these resources locally. These regions are located near Jackson, the Gulf Coast, and "a north-south belt between the loess belt and the Tombigbee River" (Russell,1987, p. 1). Today, gravel is mined in northeastern Mississippi, "a narrow belt beneath the Loess Hills that extends from Memphis, Tennessee, to south of Natchez, Mississippi, and a wide east-west belt in southern

Mississippi" (Russell, 1987, p. 1). It is most likely from these areas that prehistoric Native Americans acquired their lithic resources, as well.

According to Stallings, "the Citronelle geologic formation was an important lithic raw material source for prehistoric Native Americans" (Stallings, 1989, p. 35). It is a band of pebbles and cobbles that have been deposited secondarily along the rim of the Lower Mississippi Valley. This band of rocks extends west to east from Texas and Louisiana to Mississippi and Alabama, and south from southern Illinois to the Gulf Coast. Along with Stallings, in light of debate about whether the gravel deposit that underlies the loess is actually a part of the Citronelle formation, the material in this study thought to be from sub-loess deposits will be referred to as Citronelle (Stallings, 1989). Lithologically, there is little distinction between these gravels and those more securely a part of the Citronelle formation.

In the western part of Mississippi, the gravel deposits are found in the Loess Hills physiographic region. Pebbles and cobbles of chert, quartzite, and sandstone range in size from a few millimeters to several centimeters and can be found in gravel bars, streambeds, and exposed ridge tops that were formed during the Pliocene and Pleistocene eras. It is thought that these gravels were carried downstream by the heavy currents of the fast flowing prehistoric Mississippi, Ohio-Cumberland, and/or Tennessee Rivers, and the large boulders were transported by ice rafting (Stallings, 1989).

In the study area, a wide variety of raw materials have been recovered from archaeological sites and identified. These materials include Citronelle gravel chert, Tallahatta quartzite, and various types of quartz including milky, smoky, and rosecolored, sandstone, Coastal Plain agate, Coastal Plain chert, Burlington chert, andesite, basalt, and petrified wood.

Citronelle gravel chert. Chert is the most common raw material used in the lithic technology of prehistoric Native Americans. It is a "cryptocrystalline or microcrystalline quartz of roughly equal dimensional crystals" (Rapp, 2009, p. 76) and "can be almost any color and accommodate a wide variety of impurities that affects its workability in lithic manufacture" (Rapp, 2009, p. 78). The most common colors are white, green, bluish, brown, gray, yellow, honey-colored, and black, but can also range from a light pinkish color to a deep, dark red, which is a result of slowly heating and cooling the material in sand. Heat treatment causes "marked improvements in knapping properties" as the compressive strength is increased and point tensile strength is decreased "allow[ing] for more effective control of fracture for flaking (Rapp, 2009, p. 77). Citronelle gravel chert (CG) is the most abundant type of rock recovered from Clark Lake and it is procured locally in the form of cobbles and pebbles from nearby streambeds, gravel bars and remnant ridge top deposits from the Loess Hills (Fields & Rochester, 2003; Mooney et al., 2004; Rapp, 2009).

Tallahatta Quartzite. There are two types of quartzite: Orthoquartzite and Metaquartzite. This distinction is based upon how it was created. Both types are formed through the conversion of sandstone by the chemical precipitation of silica from interstitial waters; however, orthoquartzite is formed at shallow depths and by low pressure beneath the earth's surface, and metaquartzite is formed by the recrystallization of quartz under high pressure and high temperature beneath the earth's surface. Tallahatta Quartzite (TQ) is of the orthoquartzite type. The term porcellanite has been used to describe TQ because it has a dull aspect that resembles unglazed porcelain. This is due to its fine to medium sized pore spaces and its mixture with silty clay and opaline silica. It fractures conchoidally across the quartz grains rather than around them, which makes it a good candidate for the manufacturing of lithic tools. "Colors range from medium grey and white to almost translucent with a speckled-pepper like appearance, [from the inclusions of feldspar and glauconite], throughout the material" (Fields, 2001, p. 8). Tallahatta Quartzite is procured from the Tallahatta Formation. This formation occurs in a thin band or arc that runs southwest from Memphis, Tennessee, passing through Mississippi just south of Meridian into Alabama just north of Mobile and extends into Georgia (Fields & Rochester, 2003; Mooney et al., 2004; Rapp, 2009).

Quartz. Quartz is a fine-grained siliceous rock and is usually a very hard, compact material that fractures conchoidally. It is formed in thin veins of metamorphic rock formations of the Alabama piedmont and in the Lime Hills of southwestern Alabama as large cobbles in streambeds (Jeter & Futato, 1990). It comes in a variety of colors; however, pure quartz is transparent and colorless. The different colors come from the impurities that are included within the crystal. Milky or white quartz "owes its color to the light scattered by the large number of tiny cavities or flaws in the crystals" (Rapp, 2009, p. 37). Smoky quartz varies in color from transparent to nearly opaque and almost black to pale smoky-brown. Rose quartz varies in color from pale pink to a deep rose-red (Fields & Rochester, 2003; Mooney et al., 2004; Rapp, 2009).

Sandstone. Sandstone is a sedimentary rock formed by interlocking grains of fine to coarse-grained sand cemented together by silica, calcite, or iron oxide (Rapp, 2009). Colors range from white to a silvery grey and deep purple to black depending upon the type of cementation. It is often made from a conglomerate of chert, quartz and sand. Knappable sandstone is found throughout Southeast Mississippi and Southwest Alabama as inclusions in gravel bars and non-ferruginous or low quality deposits (Fields & Rochester, 2003; Mooney et al., 2004; Rapp, 2009).

Coastal Plain chert. Coastal Plain chert is a beige to cream-colored lightweight opaline silica rock. It is formed as silicified seams within limestone formations. It is commonly heat-treated to increase the knappability of the material. Heat-treating also causes a change in color. Coastal Plain chert is found in the southern Coastal Plain of Alabama (Fields & Rochester, 2003; Mooney et al., 2004; Rapp, 2009).

Burlington Chert. Burlington chert is a highly fossiliferous fine to course-grained crinoidal limestone rock. It has a waxy type luster that comes in a variety of colors from white, tan, cream, or light gray but it weathers to buff and reddish brown. Some banding or mottling of white or gray does occur. When heated, its base color changes to a pure white or a light pink, with some darker areas becoming orange to red due to the iron oxide deposits associated with fossil voids or fractures in the rock. It is found in the Burlington-Keokuk Limestone formation of Missouri and Illinois. It is considered to be an exotic resource (Fields & Rochester, 2003; Mooney et al., 2004; Rapp, 2009).

Andesite. Andesite is a fine-grained volcanic rock composed of plagioclase or pyroxene feldspar, and one or more minerals such as biotite and hornblende. It comes in a variety of colors from white and yellow to reddish-gray, as well as from green to blue and black. Andesites are found in abundance along active continental margins. In the Southeast, Andesite can be found within the Blue Ridge and Piedmont areas that extend from southwest along the Appalachian Mountains and the Brevard Fault Zone (which is located at the intersection of the Blue Ridge and Piedmont provinces) from Virginia through Tennessee, North and South Carolina, Georgia, and ending in mid-east Alabama (Figure 1). Andesite can be frequently mistaken for greenstone, which is a widely distributed, low-grade, basic mafic or ultramafic metamorphic igneous rock. Greenstone is used commonly as a generic term to describe the many different types of green rocks and minerals (Rapp, 2009).

Basalt. Basalt is similar to Andesite in both composition and locality. It, too, is a fine-grained, igneous rock composed of plagioclase, pyroxene, magnetite, and frequently, olivine; however, it can be medium-grained or even glassy. It ranges in color from dark grey to blue and black (Rapp, 2009).

Both Andesite and Basalt were utilized by prehistoric Native Americans for implements such as grindstones or mortars and pestles to grind nuts, seeds, and grains because of their ability to maintain a rough, hard surface, which, in turn, lessens the amount of rock grit in the prepared food items. They are also used for the manufacturing of axes, adzes, bannerstones, and hammerstones.

Petrified Wood. Petrified wood is the result of the fossilization or petrification of wood via the process of permineralization. Permineralization is the process by which minerals, such as silica, quartz calcite, or iron, from the soil, rivers or lakes impregnate the pores of plant materials and either dissolves or replaces the wood fibers and cellulose, thus taking the shape of the original material. Petrification takes place when the organic matter is completely replaced by the minerals and turned to stone. Petrified wood cobbles are found within the Citronelle formation and are oftentimes extremely difficult to distinguish macroscopically from actual (Citronelle gravel) rock(Keith, 1998). In

Mississippi, petrified wood can be found in the Petrified Forest in Flora, Mississippi approximately 39 km or 24 miles from Clark Lake.

Flora and Fauna

In the period before contact with Europeans, Native Americans had "achieved an efficient relationship with a wide variety of plant and animal resources" where they lived within the different types of biotic communities (Usner, 1983, p. 433). The biotic community to which the forests of west-central Mississippi belong is considered a southern floodplain forest. These forests include both "bottomland hardwood forests and deep-water alluvial swamps that occur in the riparian zones of southeastern rivers or streams" (Sharitz & Mitsch, 1993, p. 311). Studies have revealed that this type of biotic community provides an almost yearlong abundance of game, fruits, seeds, and nuts, which could have been used for subsistence, medicinal, and ceremonial purposes (Usner, 1983). A list of common plant species found within Sharkey, Issaquena, and Yazoo counties and their possible Native American use is included in Table 2.

Typically, the canopies of bottomland hardwood forests are thick and closed, with the exception of some areas due to the nature of soil conditions, such as texture or drainage, rather than physiographic or climatic factors. The trees in this type of forest consist of dense, medium-tall to tall broadleaf deciduous and evergreen trees and shrubs, and needleleaf deciduous trees. The different species of trees include several varieties of oak, pecan, red maple, hickory, gum, sweetgum, cottonwood, cypress, water tupelo, green ash, black willow, alder, birch, cedar, holly, and southern pine (Delcourt, Delcourt, Brister, & Lackey, 1980; Sharitz & Mitsch, 1993). The native understory of the region

Table 2

Selected Plant Species within Issaquena, Sharkey, and Yazoo Counties

COMMON NAME	SCIENTIFIC NAME	POSSIBLE NATIVE AMERICAN USES
1. Alabama Supplejack	*Berchemia scandens K. Koch*	Medicinal
2. American Black Elderberry	*Sambucus nigra L. ssp. canadensis (L.) R. Bolli*	Medicinal
3. American Elm	*Ulmus americana L.*	Medicinal
4. American Pokeweed	*Phytolacca americana L.*	Food, Medicinal
5. American Sycamore	*Platanus occidentalis L.*	Medicinal
6. Annual Marsh Elder/Sumpweed	*Iva annua L.*	Food
7. Aquatic Milkweed	*Asclepias perennis Walter*	Building, Medicinal Manufacturing, Tool
8. Atlantic Poison Oak	*Toxicodendron pubescens Mill.*	Medicinal
9. Bald Cypress	*Taxodium distichum (L.) Rich.*	Building, Tool Manufacturing
10. Black Willow	*Salix nigra Marsh.*	Medicinal
11. Blue Skullcap	*Scutellaria lateriflora L.*	Medicinal
12. Boxelder	*Acer negundo L.*	Food, Medicinal
13. Bristly Greenbrier	*Smilax tamnoides L.*	Medicinal
14. Bulbous Bittercress	*Cardamine bulbosa (Schreb. ex Muhl.)*	Medicinal
15. Camphor Pluchea	*Pluchea camphorata (L.) DC.*	Medicinal
16. Canadian Blacksnakeroot	*Sanicula canadensis L.*	Medicinal
17. Canadian Clearweed	*Pilea pumila (L.) A. Gray*	Medicinal
18. Canadian Horseweed	*Conyza canadensis (L.) Cronquist*	Medicinal
19. Carolina Coralbead	*Cocculus carolinus (L.) DC.*	Medicinal
20. Carolina Horsenettle	*Solanum carolinense L.*	Medicinal
21. Catbird Grape	*Vitis palmata Vahl*	Food
22. Cherrybark Oak	*Quercus pagoda Raf.*	Medicinal
23. Climbing Hempvine	*Mikania scandens (L.) Willd.*	Medicinal
24. Common Buttonbush	*Cephalanthus occidentalis L.*	Medicinal

Table 2 (continued).

COMMON NAME	SCIENTIFIC NAME	POSSIBLE NATIVE AMERICAN USES
25. Common Dandelion	*Taraxacum officinale F.H. Wigg.*	Medicinal
26. Common Persimmon	*Diospyros virginiana L.*	Food, Medicinal
27. Common Selfheal	*Prunella vulgaris L.*	Medicinal
28. Common Serviceberry	*Amelanchier arborea (Michx. f.) Fernald*	Food, Medicinal
29. Crimsoneyed Rosemallow	*Hibiscus moscheutos L.*	Medicinal
30. Crossvine	*Bignonia capreolata L.*	Medicinal
31. Ditch Stonecrop	*Penthorum sedoides L.*	Food, Medicinal
32. Dwarf Palmetto	*Sabal minor (Jacq.) Pers.*	Medicinal
33. Eastern Smooth Beardtongue	*Penstemon laevigatus Aiton*	Medicinal
34. Eastern Swamp Privet	*Forestiera acuminata Poir.*	Medicinal
35. Giant Cane	*Arundinaria gigantea (Walter) Muhl.*	Building, Tool Manufacturing, Medicinal, Fuel
36. Giant Sunflower	*Helianthus giganteus L.*	Food
37. Graybark Grape	*Vitis cinerea (Engelm.) Engelm. ex Millard*	Food, Building
38. Great Ragweed	*Ambrosia trifida L.*	Medicinal
39. Greater Marsh St. Johns Wort	*Triadenum walteri (J.G. Gmel.) Gleason*	Medicinal
40. Green Ash	*Fraxinus pennsylvanica Marsh.*	Building, Tool, Manufacturing, Fuel
41. Guadeloupe Cucumber	*Melothria pendula L.*	Medicinal
42. Indianhemp	*Apocynum cannabinum L.*	Building, Tool Manufacturing, Medicinal
43. Jewelweed	*Impatiens capensis Meerb.*	Medicinal
44. Jumpseed	*Polygonum virginianum L.*	Medicinal
45. Late-flowering Thoroughwort	*Eupatorium serotinum Michx.*	Medicinal
46. Laurel Oak	*Quercus laurifolia Michx.*	Paint, Dye
47. Lizard's Tail	*Saururus cernuus L.*	Medicinal
48. Texas Red Oak	*Quercus texana Buckley*	Paint, Dye
49. Virginia Snakeroot	*Aristolochia serpentaria L.*	Medicinal

Table 2 (continued).

COMMON NAME	SCIENTIFIC NAME	POSSIBLE NATIVE AMERICAN USES
50. Water Oak	*Quercus nigra L.*	Food
51. White Ash	*Fraxinus americana L.*	Medicinal
52. White Vervain	*Verbena urticifolia L.*	Medicinal
53. Willow Oak	*Quercus phellos L.*	Food, Medicinal

*Endangered Species
Adapted from USDA, The Plant Database and The University of Michigan's Native American Ethnobotany Database (after Fields 2001)

consists of palmetto, greenbrier, buttonbush, lizard tail, waterlily, water hyacinth, and over 346 different types of sedges and rushes in the swamps. In addition, a fruit-producing understory including muscadine and various other species of wild grape, sugarberry, southern dewberry, black elderberry, and serviceberry could potentially have been part of the diet of prehistoric hunter-gatherers, as well as edible seed producing plants such as sunflower, marsh elder (sumpweed), amaranth, and ragweed (Hamel & Chiltoskey, 1975; Speck, 1941).

These seed producing plants, which were used by hunter-gatherers in some parts of Eastern North America, show evidence of domestication beginning around 3500 B.P.; however, evidence for the earliest domestication of plants in the southeast, including the LMV, does not seem to appear before 850 A.D. According to Gremillion, the evidence of the late domestication of plants for subsistence suggests there was "a relatively rapid transition to dependence on maize agriculture during the last centuries of the first millennium A.D. from forest foraging subsistence base perhaps supplemented by some plant cultivation" (Gremillion, 2002, p. 483; Fritz, 1990; B.D. Smith, 1989).A wide variety of animal resources provided potential protein sources for prehistoric hunter-gatherersliving within this area and a list of common wildlife speciesfound within the

LMV and the Yazoo Basin is included in Table 3. Although the archaeological record of the Delta physiographic region does provide some evidence for prehistoric animal exploitation, faunal remains, which can provide information about subsistence practices, generally do not survive in the Delta National Forest due to the acidic nature of the soil in this bottomland hardwood, floodplain forest. Nevertheless, because of this type of soil the presence of the aforementioned different species of nut producing trees such as oak, hickory, and pecan, as well as legumes, fruits, grasses, and the buds and twigs of woody plants provided a rich habitat for the white-tailed deer. Other species found within the LMV that prehistoric hunter-gatherers may have exploited for subsistence include large mammal species such as the Louisiana black bear, cougar, and wolf, and small mammal species such as otter, muskrat, beaver, mink, raccoon, opossum, cottontail and swamp rabbit, several different varieties of squirrel, skunk, red and grey fox, and bobcat.

Table 3

Common Species of Mammals, Birds, Fish, and Reptiles in the LMV and the Yazoo Basin

COMMON NAME	SCIENTIFIC NAME
White-tailed Deer	*Odocoileusvirginianus*
Louisiana Black Bear	*Euarctosamericanus*
Cougar	*Felisconcolor*
Wolf	*Canis lupus*
Otter	*Lutra canadensis*
Muskrat	*Ondatrazibethicus*
Beaver	*Castor canadensis*
Mink	*Mustelavison*
Raccoon	*Procyonlotor*
Opossum	*Didelphis virginiana*
Cottontail Rabbit	*Sylvilagusfloridanus*

Table 3 (continued).

COMMON NAME	SCIENTIFIC NAME
Swamp Rabbit	*Sylvilagusaquaticus*
Grey Squirrel	*Sciuruscarloinensis*
Southern Flying Squirrel	*Glaucomysvolans*
Southern Fox Squirrel	*Scuriusniger*
Skunk	*Mephitis mephitis*
Red Fox	*Vulpesvulpes*
Grey Fox	*Urocyoncineraoargenteus*
Bobcat	*Felisrufus*
Wood Duck	*Aix sponsa*
Passenger Pigeon[2]	*Ectopistesmigratorius*
Wild Turkey[1]	*Meleagrisgallopavo*
Carolina Parakeet[2]	*Conuropsiscarolinensis*
Pileated Woodpecker	*Dryocopuspileatus*
Ivory-Billed Woodpecker [2]	*Campephilusprincipalis*
Double-Crested Comorant[1]	*Phalocoraxauritus*
Bald Eagle[1]	*Haliaeetusleucocephalus*
Mallard Duck	*Anasplatyrhnchos*
American Coot[1]	*Fulica americana*
Hooded Merganser	*Lophodytescucullatus*
Canadian Goose	*Brants canadensis*
Blue Heron	*Ardeaherodius*
Water Turkey / Anhinga[1]	*Anhinga anhinga*
Snapping Turtle	*Chelydraserpentina*
Blue-Tailed / Southeastern Five-Lined Skink	*Eumecesinexpectatus*
Garter Snake	*Thamnophissirtalis*
Mississippi Green Watersnake	*Nerodiacyclopion*
Common King Snake	*Lampropeltisgetula*
Eastern Indigo Snake [3]	*Drymarchoncouperi*
Southern Black Racer [3]	*Coluber constrictor priapus*
Southern Copperhead Snake (v.)	*Agkistrodoncontortrixcontortrix*
Eastern Diamondback Rattlesnake (v.)	*Crotalusadamanteus*
Alligator	*Alligator mississippiensis*

[1] Uncommon/Rare
[2] Extinct
[3] Most often referred to as "black snakes"
(v.) Venomous

In addition, a wide variety of birds might have provided other potential protein sources for prehistoric hunter-gatherers that inhabited the area. Bird species include but are not limited to wood duck, passenger pigeon, wild turkey, Carolina parakeet, pileated woodpecker, ivory-billed woodpecker, double crested cormorant, water turkey, and the bald eagle, some of which were once common but are now uncommon/rare or extinct (see Table 3). Other abundantly present bird species include mallard ducks, coot, hooded mergansers, Canadian goose, and blue heron.

Bottomland forests are associated with major rivers, streams, oxbow lakes, bayous and backwater swamps, and there is potential for the high seasonal harvesting of fish and shellfish, as well as different types of reptiles, which were important components in the diet of prehistoric hunter-gatherers. Fish species available for consumption would have included shovel bill, channel, yellow and mud catfish, buffalo, suckers, minnows, shad, perch, large-mouth bass, little pickerel, speck, carp, and gar. Fresh water mollusks, shrimp, and crawfish were abundant on the sandy flats near the Mississippi River. Common species of reptiles include several different varieties of turtles, toads, frogs, lizards, and snakes, as well as alligators.

Summary

Prehistoric people inhabiting the Lower Mississippi Valley lived in a heterogeneous environment that was capable of sustaining them through hunting and gathering. Raw materials for the manufacturing of tools included the locally available Citronelle gravel chert as well as other non-local varieties including different types of quartz, Coastal Plain chert, Coastal Plain agate, Tallahatta quartzite, basalt, andesite, and others. The heterogeneous environmentthat these prehistoric peoples inhabited is important in understanding the nature of human settlement in the Lower Mississippi Valley and at Clark Lake, to be more specific. Different kinds of strategies and schedules were necessary for prehistoric hunter-gatherers to exploit this heterogeneous environment.

CHAPTER IV

CULTURE HISTORY OF THE SOUTHEAST AND THE LOWER MISSISSIPPI VALLEY

This chapter gives an overview of the cultural history of the Southeast and the Lower Mississippi Valley, and it discusses the evolution and continuity of the different characteristics specific to the Woodland Period.

Cultural and Historical Framework

The prehistoric occupation in the southeastern United States is divided into six major stages: Paleo-Indian, Archaic, Gulf Formational, Woodland, Mississippian, and Proto-historic. However, the discussion of occupational periods is limited to only the Late Gulf Formational Stage and the Early, Middle, and Late Woodland Stages because, based upon the analysis of the ceramics recovered from the site, the lithics from Clark Lake belong to the Middle Woodland. Nevertheless, it has been determined that Clark Lake is a multi-component site that was repeatedly occupied from the Tchula period around 500 B.C. into the Mississippian period around A.D. 1400. The Gulf Formational Stage is divided into three sub-stages: the Early Gulf Formational (2500-1200 B.C), Middle Gulf Formational (1200-500 B.C.), and the Late Gulf Formational periods (500-100 B.C.). The Woodland Stage is also divided into three sub-stages: Early Woodland (500-100 B.C.), Middle Woodland (100 B.C – 400 A.D.), and Late Woodland (400 A.D – 1000 A.D.). Figure 10 shows the cultural and chronological chart for the Lower Yazoo Basin. Each sub-stage is divided into cultural periods, and each cultural period is further divided into phases. General cultural trends of each of these periods, as well as settlement adaptations and lithic technology, will be discussed for each of these periods of occupation. In addition, these trends will be associated with the Lower Mississippi Valley.

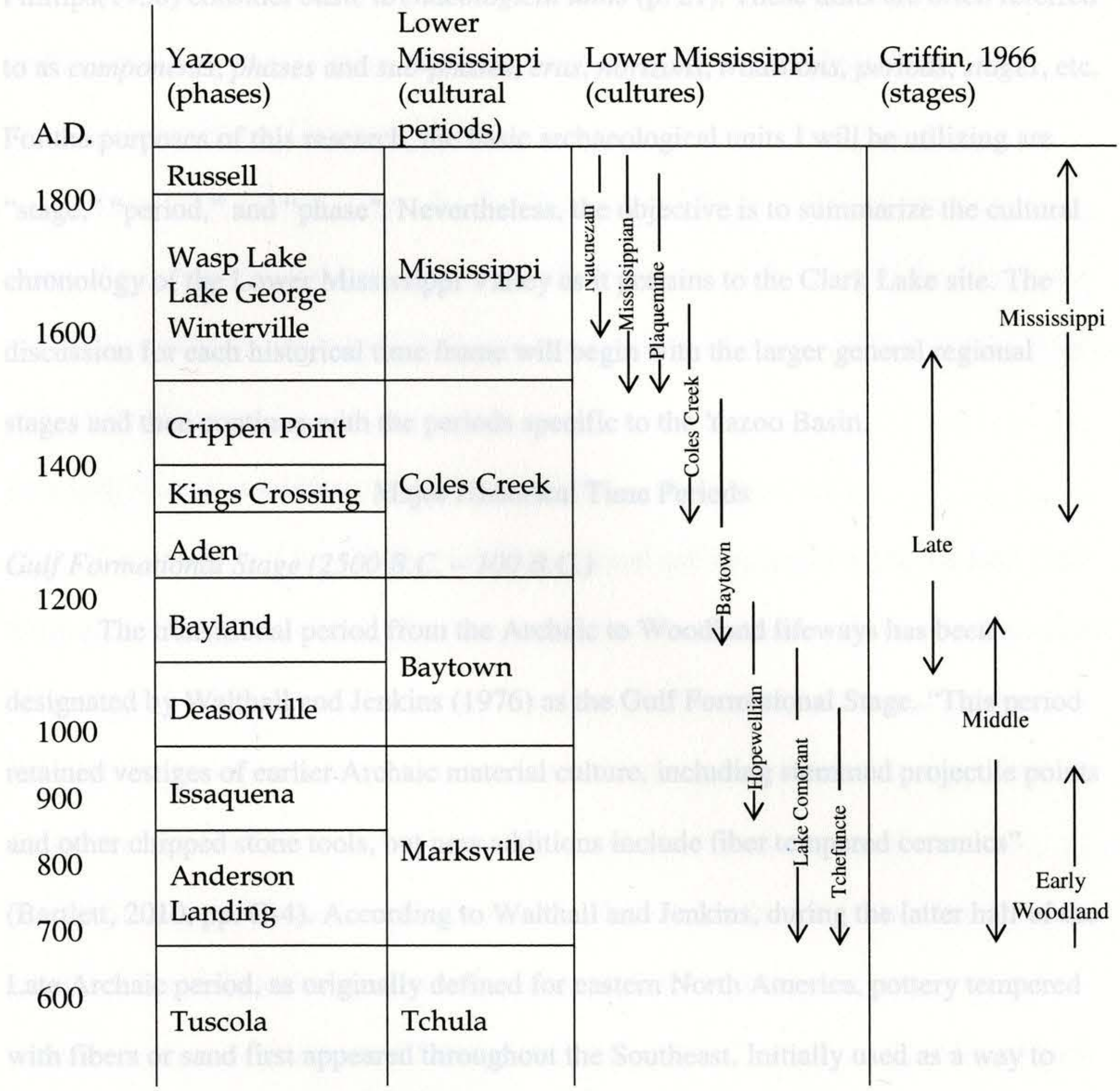

Figure 10. Cultural and Chronological Chart for the Lower Yazoo Basin (Modeled after Phillips 1979 and Brain 1989 and modified accordingly).

The following cultural chronology is based on a combination of a number of cultural chronologies and archaeological concepts proposed over the years by such individuals as William McKern, Philip Phillips, James A. Ford, James B. Griffin, Gordon Willey, Stephen Williams, Jeffrey P. Brain, Robert E. Greengo, Ned J. Jenkins, John A.

Walthall, and Marvin D. Jeter. Over the ensuing years, their various viewpoints andconcepts have evolved into a complicated understanding of, what Willey and Phillips(1958) consider *basic archaeological units* (p. 21). These units are often referred to as *components*, *phases* and *sub-phases*, *eras*, *horizons*, *traditions*, *periods*, *stages*, etc. For the purposes of this research, the basic archaeological units I will be utilizing are "stage," "period," and "phase". Nevertheless, the objective is to summarize the cultural chronology of the Lower Mississippi Valley as it pertains to the Clark Lake site. The discussion for each historical time frame will begin with the larger general regional stages and then continue with the periods specific to the Yazoo Basin.

Major Historical Time Periods

Gulf Formational Stage (2500 B.C. – 100 B.C.)

The transitional period from the Archaic to Woodland lifeways has been designated by Walthall and Jenkins (1976) as the Gulf Formational Stage. "This period retained vestiges of earlier Archaic material culture, including stemmed projectile points and other chipped stone tools, but new additions include fiber tempered ceramics" (Bartlett, 2010, pp. G-4). According to Walthall and Jenkins, during the latter half of the Late Archaic period, as originally defined for eastern North America, pottery tempered with fibers or sand first appeared throughout the Southeast. Initially used as a way to differentiate the timing of the introduction of ceramics and different types of ceramic production between the Northeast and the Southeast portions of the United States, the Gulf Formational Stage is defined primarily on the basis of these distinctive pottery types with a geographical distribution that is restricted to the Southeast. Specifically, the Gulf Formational Stage extends across the Coastal Plain from South Carolina, through Georgia, Alabama, and Mississippi into Louisiana. In these areas, this stage incorporates the terminal Late Archaic and the early Woodland Period. Given this limited distribution and little evidence of culture change throughout the region, this time construct is poorly understood and, as a result, has not been wholly accepted by many archaeologists working in the Southeast, many of whom use the traditional Late Archaic or Early Woodland timeframes (Prentice, 2000).

Like other cultural stages, the Gulf Formational Stage is divided into three sub-stages: Early, Middle, and Late. As previously noted, since habitation of the Clark Lake site appears to begin around 400 B.C., the Early and the Middle Gulf Formational Stages will not be discussed.

Late Gulf Formational/Early Woodland (500 B.C. – 100/200 A.D.)

By the close of the Middle Gulf Formational and the beginning of the Late Gulf Formational/Early Woodland, fiber-tempered ceramics appeared sporadically throughout Mississippi, Louisiana, and Tennessee. It is these fiber-tempered ceramics, known as Wheeler Fiber tempered, that serve as the basis for assigning sites to this stage. Still, during the Late Gulf Formational/Early Woodland, the manufacturing of ceramics became widespread throughout the Southeast, which led to the demise of fiber-tempered ceramics. These fiber-tempered ceramics were replaced by sand- and clay-tempered ceramics such as Alexander and Tchefuncte pottery types. Contrary to this idea, Gibson and Melancon believe that clay-tempered Tchefuncte wares "appear in preceding or coeval contexts with earlier fiber-tempered materials" (Gibson & Melancon, 2004, p. 169). Nevertheless, these types were widely adopted by the Native American groups that inhabited the Louisiana and Mississippi coastal plain and exhibit a variety of decorative techniques, vessel shapes, paste and temper characteristics (Saunders, Hays, & Society for American Archaeology, 2004; Walling & Roemer, 1993).

Tchula Period (Late Gulf Formational 500 B.C – 1 A.D). In the Yazoo Basin, the Tchula period is synonymous with the Late Gulf Formational, It encompasses the division of time referred to as Early Woodland in other chronological frameworks (e.g., Anderson & Mainfort, 2002). This period is represented by the Tchefuncte culture in the southern portion of the valley, while in the northern portion of the valley is represented by the Lake Comorant culture. The Tchula period is a modified, less elaborate version of the Poverty Point/Middle Gulf Formational culture in that it lacks the elaborate long-distance trade network, large mound complexes, and lapidary or exotic stone industries (Toth, 1988). It is also regarded to be approximately correspondent in time to some part of the Adena culture in the north (Griffin, 1967).

Tchefuncte people were relatively sedentary hunters, fishers, and gatherers who lived nearly year round in relatively autonomous and isolated camps, small hamlets, or villages. A band level of social organization is inferred for the Tchula period. Tchefuncte sites are typically located in floodplain "slackwater" (Toth, 1988, p.20)environments with access to upland locations during time of flooding. They are rarely found along the Mississippi River or its more active rivers and outlet streams and are usually grouped around a ceremonial mound site.

Diagnostic artifacts from the Tchula period are predominantly ceramic and include two distinctive ceramic series: Tchefuncte and Alexander. Other artifacts from this period include plain and decorated tubular pipes, bone tools possibly made from unusual or exotic animal species that are typically geared toward hunting and fishing technologies, shell tools, pendants and baked clay Poverty Point objects (PPOs). Lithic artifacts include projectile point types such as Ponchartrain, Ellis, Kent, Macon, and Gary. Along with these points, ground-stone tools such as plummets, bannerstones, bar weights, mortars, and soapstone bowls, as well as debitage, burins, notched pieces, and denticulates (Hays & Weinstein, 2010).

Subsistence data indicate a strong dependence on a wide range of floodplain resources. Specifically, these resources include mammalian taxa (deer, otter, wolf, bear, fox, cougar, and raccoon), reptilian taxa (alligator, snake, and turtle), avian taxa (duck, goose, eagle, swan, and crane), fish (sheepshead, gar, shark, drum, catfish, alligator gar, and bowfin) and shellfish (oyster, clam, and river mussels) (Byrd, 1974; Hays & Weinstein, 2010; Lewis, 1997). At some sites, such as Morton Shell Mound on the Louisiana coast, simple horticulture may have been practiced as several kinds of plant cultigens (squash and bottle gourd), as well as other native wild resources (greenbrier, persimmon, knotweed, wild plum, grape, and haws) have been found (Hays & Weinstein, 2010).

Within the Yazoo Basin, the Tchula period is subdivided into three phases: Tuscola, Norman, and Turkey Ridge. Each of these phases is culture and region specific. The Tuscola phase, also known as the southern Tchula in the 1951 Lower Mississippi Valley Survey by Phillips, Ford, and Griffin, is solely defined by the presence of Tchefuncte pottery. The Norman and Turkey Ridge phases, also known as the northern Tchula, have been attributed to the Lake Comorant culture, and are distinguished by the distinctive Lake Cormorant ceramics recovered from the various sites. Another phase, the Boyd phase, has been suggested by Connaway and McGahey (1971) on the basis of the differences in the ceramic inventory found at the Boyd site, even though the type site for the Turkey Ridge phase was located approximately 20 miles away; however, Toth includes the site in the Turkey Ridge phase (J. Ford, 1990, p. 105; Toth, 1988).

What the Boyd site is noted for, however, is that it is the first site where evidence of mound construction for the Lake Comorant culture was found (J. A. Ford & Willey, 1941). This evidence can also be linked to other contemporary mound sites located in the area, which include Tidwell, McCarter, Tyson, Clear Creek, and Little Spring Creek (J. Ford, 1990). Nevertheless, while these sites are "unquestionable elements of the Lake Cormorant culture in northwest Mississippi," "the question of whether Tchefuncte people constructed mound of any type is somewhat contentious" and "has long been a topic of discussion and moderate skepticism"(Hays & Weinstein, 2010, p. 107). Gibson and Shenkel argue that mound construction "rivaled and perhaps exceeded later Marksville structures" (Gibson & Shenkel, 1988, p. 9). In contrast to this assertion, Griffin earlier had argued that mounds were not constructed during this time frame (Griffin, 1979). Perhaps the most prominent examples of Tchula Period mounds is the Batesville Mound group, which is located in Panola County, Mississippi and the Lafayette Mounds, which are located in Lafayette Parish, Louisiana (Brown, 1973; J. A. Ford & Quimby, 1945; Rafferty, 2002).

Typically, mounds constructed during this time period are conically shaped and usually come in groups of two to three; however, they also come singly. Charnel houses, where the remains of the dead are placed prior to their final disposition, are also built during this time frame (Prentice, 2000).

Mortuary data for the Tchula Period shows that the dead were typically buried in shallow, unadorned graves in midden deposits, and their bodies were flexed, with the leg bones broken in some cases. Secondary burials, where the bones are sometimes scattered throughout the midden, are also found. Little to no grave goods accompany the remains (J. A. Ford & Quimby, 1945; Hays & Weinstein, 2010).

Woodland Stage (500 B.C. – 850 A.D)

In the chronological framework employed here, the Woodland Stage begins what has been traditionally labeled as Middle Woodland. The Middle Woodland began around 100 B.C and ended around A.D. 500 and the Late Woodland began around A.D. 500 and ended around A.D. 1000. Each sub-stage is divided into cultural periods and each cultural period is further divided into phases. As previously noted, since the discussion of the Gulf Formational Stage incorporated the Early Woodland, the Early Woodland cultural succession will not be discussed in the Woodland Stage.

Middle Woodland (200 B.C. –400 A.D.)

The Middle Woodland period is evidenced by the diffusion of the Hopewell ceremonial complex across the Southeast. This diffusion is demonstrated by the construction of burial mounds, common artifacts and iconography, and a shared ideology that seems to indicate that Middle Woodland groups extensively interacted with each other through a far-reaching trade and exchange network, as well as through ritual and ceremonial activities. According to Anderson and Mainfort (2002), it is viewed as a period of pan regional communality among many diverse cultures within the Hopewell interaction sphere in the Southeast (Anderson & Mainfort, 2002; Bense, 1994).

The Woodland Stage in the Yazoo Basin is synonymous with the period that points to influences from the North and Mid-Atlantic when their traditions began to take a hold (Griffin, 1967). This is particularly evident with the Marksville period and its Hopewellian influences.

Marksville Period. The Middle Woodland period in the Lower Mississippi Valley encompasses the Marksville period and its incorporated phases. According to Toth, "archaeologically, the cultural shift is marked by the abrupt appearance of conical burial mounds and a distinctive set of ceramic decorations some of which closely parallel certain Hopewellian pottery of the Illinois Valley" (Toth, 1979, p. 9).

Marksville people continued to hunt, fish, and gather as did their Tchula predecessors, and it seems as though they settled in villages for "relatively permanent for extended periods of time" (Toth, 1979, p. 194). In contrast to the Tchefuncte pattern of distribution of sites in *slackwater* environments, Marksville sites seem to be oriented toward alluvial areas in upland zones adjacent to the floodplain along active channels of the Mississippi river and secondary streams. Woodland sites appear to be widespread; however, Marksville sites appear to cluster in specific areas along the Mississippi River from as far north as Memphis, TN to as far south as Baton Rouge, LA, but this may just be a result of bias in survey practices (Kidder, 2002; Toth, 1979, 1988).

Three different types of Marksville sites have been have been identified: conical burial mounds, villages, and villages with conical burial mounds (Toth 1979). However, there is little evidence of a hierarchical structure of social organization (McGimsey, 2010). Favored sites were occupied and reoccupied for a number of years, only uninhabited when "flooding forced a short-term withdrawal to higher ground" (Toth, 1979, p. 197). Toth has even suggested "if the settlement pattern for the Dorr phase . . . holds for the entire Lower Valley, villages were positioned lineally at short intervals (perhaps 3 to 5km) along natural levees or other features paralleling water bodies" (Toth, 1979, p. 197).

Diagnostic artifacts from the Marksville period are predominantly ceramic as well. These ceramics have distinctive attributes that draw striking parallels to the Havana Hopewell pottery in the Illinois Valley. These attributes include crosshatched rims, raptorial bird designs, broad ∩-shaped incising, zoned dentate-rocker stamping, and cord-wrapped stick impressions (Toth, 1979, p. 1988). Aside from pottery, artifacts from this period include copper panpipes, earspools and beads, decorated and undecorated platform pipes and ceramic figurines, exotic raw materials such as galena, mica, and greenstone, marine shells and freshwater pearls, and large carnivore canines (Toth, 1979).

Although there is not a distinctive lithic assemblage, common projectile points during the Marksville period include lanceolate, stemmed dart points such as Kent, and Gary types. Boat-shaped atlatl weights, small chipped celts, and bipointed drills are also included, and there is some indication there was a strong blade-core industry that produced prismatic blades that closely resemble those found in the Illinois valley. Stone tools were manufactured with the locally available gravel cherts and, according to McGimsey, "there is virtually no evidence for a systematic flake-tool industry, although some larger flakes exhibit minor use-wear, reflecting opportunistic use of available pieces" (McGimsey, 2010, p. 127).

Subsistence data indicates a continuing trend from the Tchula period through the Coles Creek period of hunting and gathering of the locally available food resources, making the Marksville period virtually indistinguishable from earlier or later periods (Fritz & Kidder, 1993; Jackson & Scott, 2002; McGimsey, 2010). Faunal data shows there is considerable variability indicating a strong reliance on locally available resources. Nevertheless, according to McGimsey, "subsistence practices remain one of the least-documented aspects of the archaeological record of the Marksville period," which "reflects, in part, a lack of emphasis on subsistence data during earlier excavations, but . . . also indicates the paucity of sites excavated in recent years with . . . good faunal or botanical perseveration" (McGimsey, 2010, p. 130).

Although there is evidence for the construction of conical burial mounds during the Tchula period, one of the horizon markers for the Marksville period is that of conical mounds. While the practice of mound burial is parallel to Hopewell mortuary customs, it has been shown there is "considerable deviation in Marksville from Hopewellian burial procedures and no great uniformity in burial practices" (Toth, 1979, p. 195). One exception is Helena Crossing in Arkansas near the confluence of the Arkansas and Mississippi rivers, where Ford found elaborate log-lined tombs containing a small number of extended burials with status-related grave goods, indicative of direct Hopewellian influence. Elsewhere, the vast majority of burials indicate "everyone received more or less the same level of ceremony in mortuary treatment," suggesting that Marksville societies were "largely egalitarian with little class differentiation between individuals" (McGimsey, 2010, pp. 128-129). Another interesting fact is that Marksville burial mounds are often found adjacent to or near associated villages (Toth, 1979).

Earthen embankments were also constructed during this time frame. Three large, semicircular earthen enclosures are located in the Lower Yazoo Basin. Known as *the three sisters*, Spanish Fort, Little Spanish Fort, and Liest were examined by the Lower Mississippi Survey and were shown, in subsequent examinations, to share the same general configuration and share a striking resemblance to the *sacred enclosures* of the Adena that were recorded by Squier and Davis (Jackson, 1998; Toth, 1979).

The Marksville period in the basin has been temporally subdivided into the Early Marksville and Late Marksville period based predominantly upon ceramic evidence and the association of Hopewell artifacts, mainly in the earlier half of the period (Toth, 1979; 1988). Toth (1979) makes two basic distinctions to separate one from the other. The first distinction is the difference in paste, and the second is the distinct changes in the decorative treatment and motif. Along with the ceramic evidence, this divide is also based upon cultural evidence as well. Early Marksville begins with the rise of the Hopewellian influence within the LMV and ends with its demise around 200 A.D. Late Marksville encompasses the time when the Marksville culture continued to develop after contact with the Hopewell ended (Toth, 1988). Within the basin, the Early Marksville period is represented by five geographically separable phases: Anderson Landing in the south, Kirk in the central section, Dorr in the north, Twin Lakes in the east, and Helena in the west (Morgan, 2010). The Late Marksville period is represented by four geographically separable phases: Issaquena is prevalent throughout the basin, Paxton in the northeastern part of the basin, Porter Bayou in the central section, and Prairie in the upper Sunflower region.

Anderson Landing phase. The Anderson Landing phase was formulated by Phillips on the basis of it being a "logical necessity" rather than archaeological evidence and that it was "an outgrowth of findings of the 1954-1955 excavations by Robert Greengo and [himself]" (Phillips, 1970, p. 534). The chronological placement of this phase in time is dependent upon the Havana Hopewell-like decorative treatments on the ceramics recovered from excavations at the Manny, Thornton, Mabin and Anderson Landing sites. Nevertheless, it is thought that this phase was nothing more than "a convenient pigeonhole in which to put any component that looks sufficiently Hopewellian and early" (Phillips, 1970, p.11; Toth, 1988, p. 145).

Kirk phase. The Kirk phase was formulated by Phillips on the basis that it "might represent an undefined phase on an early Marksville period level – earlier than Issaquena I, but not so early as Anderson Landing because of the lack of Marksville Stamped, var. Mabin" (Phillips, 1970, p. 894). Kirk phase ceramics seem to be predominately cord marked or of the Marksville Stamped type. Still, according to Toth, "the Kirk phase seems to be a legitimate cultural unit with adequate geographical and ceramic uniformity to separate it from contiguous cultural manifestations" (Toth, 1988, p. 138).

Twin Lakes phase. To accommodate sites with Early Marksville diagnostic ceramics, the Twin Lakes phase was formulated by Phillips "solely as a frame of reference" (Phillips, 1970, p. 891). However, that the Twin Lakes phase is even a phase has been greatly debated (Connaway & McGahey, 1971; Johnson, 2001). According to Johnson (2001), it is perhaps better considered part of the Tidwell phase of Lake Cormorant culture.

Dorr phase. The Dorr phase, named for the Dorr site, is where the first discovery of Hopewellian material in the LMV was made (Phillips, 1970). The ceramics, along with the distinctive mortuary practices, are what set this off as a separate phase.

Helena phase. The Helena phase is important in that the Helena Crossing site is used to fill the gap between the Illinois Hopewell in the north and the Marksville in the south because the site itself is located almost in the center between the two and because it "provided specific Hopewellian artifacts hitherto unreported from the area" (Phillips, 1970, p. 17).

Issaquena phase. The Issaquena phase is the phase that is most well known in the LMV and it is "one of our better-developed constructs" (Williams & Brain, 1983, p. 360). "The fundamental criteria upon which this phase is postulated are a number of ceramic types that appear as an integrated complex," and while "there are several other cultural features associated with the phase, . . . these are not as well-known as the ceramics"(Greengo, 1964, p. 16).

Settlement patterning during the Issaquena phase indicates sites were widely dispersed and situated in the flood plain and in the higher alluvial remnants along the lower Yazoo River and the Mississippi River, as well as the Sunflower River and the Bogue Phalia Drainage. These sites are considered to be "small, with midden concentrations not over 100m. apart, indicating small communities with social groupings perhaps the size of a lineage or two" (Greengo, 1964, p. 109). At several Issaquena sites, both conical and rectangular mounds have been discovered, but the dating of these is unsure.

Diagnostic ceramic artifacts include Alligator Incised, Churupa Punctated, Evansville Punctated, Marksville Incised, Marksville Stamped, and Indian Bay Stamped. However, a large majority of ceramics are of the undecorated type of Baytown Plain. Non-ceramic diagnostic artifacts associated with this phase include platform and elbow pipes, and clay effigies. Lithic artifacts include Gary Stemmed *var. Maybon* and *Ellis* projectile points, blades, boatstones, and plummets. Worked bone artifacts include deer antler used for flaking and hafting handles, deer ulna awls, fishhooks, and projectile points (Greengo, 1964, pp. 77-86).

Subsistence data for this period is limited because there is a "lack of adequate flotation-retrieved paleoethnobotanical data for interpreting subsistence change and monitoring agricultural development in the Lower Mississippi Valley" (Fritz & Kidder 1993, p. 2). However, Fowkes recovered a ceramic pot with remnants of "corn, squash, and perhaps other forms of food" from Mound 4 at the Marksville site, and there was some seeds (chenopod, amaranth, and gourd) recovered from the "fire level" at the Troyville site (Fowkes, 1928, pp. 411-412). At best, the floral remains from these two sites are considered to be "unauthenticated," "suspect," and "of limited usefulness" to understanding subsistence practices during this time period (Fritz & Kidder 1993: 7). Other research, however, indicates that acorn, pecan, grape, persimmon, and palmetto were gathered rather intensely harvested. Nevertheless, there has been some research completed which looks at subsistence practices for the later Coles Creek and Mississippian periods in the Lower Mississippi Valley (Flosenzier, 2010; Fritz, 2008; Fritz & Kidder, 1993; Jackson, 2008; Kidder & Fritz, 1993). On the other hand, faunal remains recovered from sites such as Rock Levee (22BO637) and the Welcome Center (22CO573/773) indicate a reliance on deer and fish, as well as reptiles, birds and small mammals (Jackson, 2008).

Paxton phase. The Paxton phase was established by Phillips on the basis of a unique "pottery complex that combines Issaquena and non-Issaquena elements" (Phillips, 1970, p. 545)(Deasonville material even though there is not a Deasonville component at the Paxton site). Nonetheless, this phase is considered tentative at best by Phillipsand by Williams, and Brain (Phillips, 1970; Williams & Brain, 1983).

Porter Bayou and Prairie phases. Porter Bayou is another tentative phase that was established by Phillips. This phase was built upon the surface collected ceramics found at a handful of sites that exhibit a Late Marksville, non-Issaquena like character. Finally, the Prairie phase was established by Sam Brookes to accommodate the growing body of material and fill a gap in the archaeology of the upper Sunflower region of the basin (Brookes, 1980).

Late Woodland Period (300-400 A.D. – 850 A.D.)

According to Nassaney and Cobb (1991), the Late Woodland period has been characterized as a time of decline because of its lack of so-called *climax cultures*, such as either the Hopewell or the Mississippian cultural expressions (Nassaney & Cobb, 1991). One reason for this is the lack of elaborate earthworks and mound building, as wells as decorative artifacts for which the preceding and succeeding cultures are known. The other is related to the end of the Hopewell ceremonial complex during the early part of the Late Woodland; nonetheless, the Late Woodland, in fact, was a time of considerable variation and appreciable cultural change in the Southeast, and it has been described by Bruce Smith as one of the most intriguing and important periods in Southeastern prehistory. Dramatic and abrupt changes took place in subsistence (e.g., intensification of maize agriculture), technology (e.g. adoption of the bow and arrow), settlement patterns (e.g., establishment of site hierarchies), social organization (e.g. social ranking), and long-distance trade and exchange networks for which the Middle Woodland was noted during this time (Nassaney & Cobb, 1991; B. D. Smith, 1986).

Chronologically, the Late Woodland can be divided between the Baytown Period and the Coles Creek Period, and their incorporated phases can be separated out geographically.

Baytown Period. The Baytown period is defined by Phillips as "the interval between the decline of Hopewellian culture and the consolidation of Coles Creek culture in the southern half of the Lower Mississippi Valley" (Phillips, 1970, p. 901). During this time frame, there was a quantitative and qualitative decline in decorated wares, as well as other artifactual materials, and the majority of ceramics is dominated by plain wares. Nonetheless, there seems to be an increase in cord marking and red filming as a decorative treatment, but neither originated during this period in time.

As with the previous Tchula and Marksville phases, subsistence continues to be characterized by hunting, gathering, and fishing, and by the end of this period, it is generally thought that horticulture of locally available seeds and grasses and/or the development of the agriculture of maize appeared for the first time. It has also been inferred that settlement patterning consisted of dispersed villages and hamlets that do not appear to be associated with any major social or religious centers. It was also during this time frame that the bow and arrow was introduced (Blitz, 1988; Brain, 1971).

Archaeologically, for this time frame, the Yazoo Basin can be divided into subareas: the Southern subarea and the Northern subarea. The Southern subarea has received the most attention, which can be attributed to the works of Philip Phillips with his Yazoo Basin Survey and Stephen Williams and Jeffery P. Brain and their work at Lake George. The cultural chronology for this area is strong and fairly well understood.

In comparison, however, the archaeological research conducted in the northern portion of the Yazoo Basin has been minimal. Consequently, as a result, the cultural chronology in this area is poorly understood. During the Baytown period, in the Yazoo Basin, the Southern subarea is represented by the Deasonville and the Bayland phases, and the Northern subarea is represented by the Coahoma and the Baytown phases. During the Coles Creek period in the Yazoo Basin, the Southern subarea is represented by the Aden, Kings Crossing and Crippen Point phases, and the Northern subarea is represented by the Peabody and the Walnut Bend phases. In favor of the overall general trends of the Coles Creek period, the individual phases of the Coles Creek period will be discussed only insofar as there are differences.

Deasonville phase. The Deasonville phase, according to Williams and Brain, is considered to be "an archaeological phoenix" because of its reemergence, and the resurrection of Ford's original concept, as a cultural unit by Phillips (Williams & Brain 1983, p. 364). According to Phillips, it is considered to be "one of the strongest units in [the] Yazoo sequence" (Phillips, 1970, p. 546). Its placement in the cultural chronology of the Yazoo Basin is strictly based upon the material cultural remains recovered from the Manny site; however, it should be noted that these remains were not in an isolated context and were often mixed with material remains from the preceding Issaquena phase. The ambiguous nature of the Deasonville deposits is further corroborated with the excavations conducted at the Lake George site, where this phase actually marks the first distinguishable archaeological context at the site (Williams & Brain, 1983).

Settlement patterning during the Deasonville phase indicates sites were concentrated along the Yazoo and Deer Creek meander belt ridges and, to a lesser extent, along the Sunflower River. Most Deasonville settlements are associated with shell middens "often disposed in a circular arrangement of individual middens . . . referred to as the Tchula Lake pattern" that "represent individual households in a camp circle" (Phillips, 1970, p. 549). There also seems to be "an intensive Deasonville occupation along the Bogue Phalia;"however, these sites lack the characteristic shell middens because of the different ecological environment of the area (Phillips, 1970, p. 365). This area has been "grouped into a loosely defined 'Western Deasonville Phase'" (Phillips, 1970, p. 366). Some Deasonville sites have been associated with conical shaped mounds but this is not definitive as it is possible these mounds were built during an earlier period. The vast majority of sites do not have mounds of any kind (Phillips, 1970).

The Deasonville phase is defined by Phillips by the different ceramic types and varieties. Diagnostic ceramics from this period include Baytown Plain, Mulberry Creek Cordmarked, Larto Red, Alligator Incised, Coles Creek Incised, Evansville Punctated, Hollyknowe Ridge Pinched, French Forks Incised, Quafalorma Red and White, Landon Red on Buff, and Woodville Zoned Red. The last three are considered the most important markers for the Early Baytown period because of their exotic nature (Williams & Brain, 1983). Non-ceramic diagnostic artifacts include *choppers*also known as *Mound C scrapers*, Clairborne and Edwards type projectile points, and platform pipes, as well as the shell middens previously discussed.

Subsistence data during the Deasonville phase indicates that hunting and gathering was the main practice and the Deasonville peoples exploited a wide range of available resources that includes berries, nuts and seeds, fish, and especially shellfish, which is indicated by the large amount of shells recovered from the many different

Deasonville sites. It was also during this time frame that the bow and arrow was introduced. This is a further indication of the practice of hunting and their exploitation of terrestrial resources. Faunal remains recovered from sites such as Rock Levee (22BO637) include large mammals such as deer, small mammals such as rabbit and squirrel, birds, reptiles, amphibians, and fish (Jackson, 2008).

At issue during this time frame is that of agriculture because, it is thought, incipient agriculture or, at the very least, rudimentary horticulture was practiced; however, there is no direct evidence of this. There is some indication, however, that maize was grown during this time frame. This is evidenced by the recovery of fragments from four Late Woodland components but verification of the dates through direct AMS dating is needed. This is further confounded by the context in which it was found because the recovered botanical remains were often unearthedwith artifacts from earlier and later stages (Fritz, 2008, p. 334).

Another issue that seems to be unresolved during this phase is that of whether or not mounds were constructed. According to Phillips (1970), many Deasonville sites are associated with conical mounds, but he wants a more solid base of evidence that these mounds were constructed during this time frame. Nevertheless, it has been inferred that the sparseness of mounds found during this time frame indicates that mound building declined somewhat.

Bayland phase. According to Phillips (1970), the Bayland phase was defined on the basis of the stratigraphically recovered artifacts from Mound C at the Lake George site. He considered this phase to be either "Baytown, Coles Creek, or transitional between them," but according to Williams and Brain, this could not be any further from the truth

(Philips, 1970, p. 12; Williams & Brain, 1983, pp. 366-367). In many respects, the Bayland phase is similar to that of the Deasonville phase with regards to the ceramics and stone tools.

Settlement patterning during the Bayland phase indicates that Bayland peoples lived in small residential hamlets and that there was a renewed interest in "constructional activities" (Williams &Brain, 1983, pp. 367-368). However, according to Williams and Brain, nothing further is known about regional site plans during this time, but according to Philips (1970), this too is a carry-over from the Deasonville phase. Another characteristic of Bayland settlement patterns is that Bayland sites were oriented along the Mississippi and the Yazoo rivers of the region and distributed coincident with former Deasonville occupations (Williams & Brain, 1983, pp.368-369).

As with the Deasonville phase, the Bayland phase is also defined along the basis of its different ceramic types and varieties. Diagnostic ceramics from this time period include Larto Red *var. Silver Creek*, Mulberry Creek Cordmarked *var. Smith Creek*, Coles Creek Incised vars. *Stoner*, *Wade*, and *Chase*, and French Fork Incised *var. Wilzone* (Williams & Brain, 1983, p. 315). Non-ceramic diagnostic artifacts include *Mound C scrapers* (which are also indicative of the Deasonville phase), Clairborne, Collins, Enola, and, possibly, Gary projectile points and fishhooks.

Subsistence data indicates that Bayland peoples continued to exploit the broad resource base, including the continuation of the exploitation of aquatic resources, with the exception of shellfish. This is a point of contention between Phillips (1970) and Williams and Brain (1983), with the latter arguing that, although shellfish was exploited as a dietary resource, it was not exploited to the extent as in the earlier Deasonville phase.

Although it appears that the construction of mounds decreased during the previous Deasonville phase, it just so happensthat the construction of mounds increased during the Bayland phase as is evidenced by the construction of the platform Mound C at Lake George. The construction of this mound is, perhaps, indicative of a change in cultural practices and non-subsistence activities from that of burial practices to ceremonial practices. Phillips felt that the transition from the previous conical shaped burial mounds to the platform mounds represented "the end of the tradition so far as the Yazoo region is concerned" (Phillips, 1970, p. 551).

Coahoma phase. The Coahoma phase is the contemporaneous phase of Deasonville in the northern subarea of the Yazoo Basin. It was originally described by Williams in his paper on settlement patterns in the LMV, followed by Belmont, and then ultimately reworked by Phillips (Belmont, 1961; Phillips, 1970; Williams, 1956). The dating of this phase is based upon stratigraphic evidence originally recovered from the Oliver site (22CO503) and further established by Sam Brookes at the Boyd site (22TU531).

Settlement pattern distribution suggests that Coahoma sites widely dispersed throughout the northern subarea throughout what Phillips has labeled Tiers 13-19 in the "Upper Sunflower" region (Philips, 1970, pp. 864, 906). Shell middens, which are distinctive for the Deasonville phase, only occur infrequently throughout the Coahoma phase.

Diagnostic artifacts from this time frame continue to be primarily ceramic in nature. The type of ceramics include Mulberry Creek Cordmarked, Withers Fabric Marked, Larto Red, Alligator Incised, Mazique Incised, and Indian Bay Stamped (Philips, 1970, p. 906). Non-ceramic artifacts, which are limited to the Acree site (22BO551), include shell hoes, and bone and antler tools (Connaway, 1981). Other work is being conducted at present for the artifacts recovered from the Shady Grove site (22QU525).

Knowledge of mound building during this phase is limited at best, with the Shady Grove site potentially being the only one with a Coahoma phase mound. If so, it appears that what mound building did take place produced conically shaped edifices, and it is generally assumed that these were associated with mortuary practices. Nevertheless, there is no definitive data available as of yet (Phillips, 1970, p. 907).

Baytown phase. It was not until the discovery of the Baytown site that the Baytown culture was defined, but the culture, in and of itself, should not be confused with the phase. This phase, according to Phillips, is rather ill-defined both in its large area and in extensive distribution, and survey data for this phase is incomplete (Phillips, 1970, p. 903).

Settlement patterning indicates that Baytown phase sites are located in the Lower St. Francis Basin, the Lower White River Basin, and the Arkansas River Lowland. However, there is some indication that sites (Lake Cormorant [22DS501] and Withers [22DS515]) are located in the upper Yazoo Basin, as well, but these have been excluded based upon contextual evidence of earlier and later components (Phillips, 1970, p. 904). Most Baytown sites are comprised of groups of small mounds "strung out in lines along the crest of sand ridges" (Phillips, 1970, p.904) which clearly stand out in contrast to Marksville period burial mounds.

Baytown phase diagnostic ceramics include both Baytown Plain and Mulberry Creek Cordmarked. Although the ceramics, in and of themselves, are not really diagnostic, it is the ratio between the two that is. The ratio of Baytown Plain to Mulberry Creek Cordmarked should approximate three or four to one, with some exceptions where they are equal and sometimes outnumber Mulberry Creek Cordmarked (Philips, 1970, p. 904).

Troyville culture. While the Baytown culture is typically associated with sites "found in the northern LMV from the Yazoo Basin northward, . . . Baytown Period sites to the south and west in present day Louisiana are generally associated with Troyville Culture" (Lee, 2010, p. 135). While Ford conceived Troyville to be a distinct cultural-historical construct that tied together the Marksville period to the Coles Creek period, others, such as Belmont (although he later reconsidered this position), thought Troyville was part of the Black River and the Fort Adams phase of the Louisiana Baytown culture, rather than being distinct in its own right (Belmont, 1982, p. 79). "Still others, i.e. Neuman (1984), do not distinguish between Troyville and the succeeding Coles Creek culture," but this is mainly a problem in South Louisiana, not in the Mississippi Delta (Fullen, 2005, p. 32). Nevertheless, Troyville represents a transitional culture "with related socioeconomic and political developments that provided a foundation for the development of [the] more complex Coles Creek societies" (Lee,2010, p.135). Sites associated with the Troyville culture that demonstrate this cultural continuity include the Greenhouse site (16AV2), where the Troyville concept was first envisaged by Ford and Willey, the Lac St. Agnes site (16AV26), Mount Nebo (16MA18), Fredericks (16NA2), McGuffee (16CT17), Gold Mine (16RI13), and Troyville (16CT7) (Jeter, Rose, Williams, & Harmon, 1989; Lee, 2010).

Settlement patterning of Troyville sites suggests these sites are usually located along rivers, terraces, streams, and natural levees and range in size from hunting camps and small habitation sites to mortuary and large multi-mound centers, which Belmont suggests existed in a type of site-hierarchy (Belmont, 1982; Jeter et al., 1989; Lee, 2010). Mounds at these sites are usually arranged in an oval pattern around a plaza (Jeter et al. 1989).

Diagnostic artifacts of the Troyville culture consist of several types of ceramics that "attest to a strong continuity from Issaquena through Troyville to Coles Creek" (Belmont, 1982, p. 92). Early Troyville ceramic assemblages include late varieties of Marksville Incised and Marksville Stamped *var. Troyville* (formerly Troyville Stamped), which are characterized by broad ∩-shaped incised zoning. Later Troyville ceramic assemblages include Churupa Punctated, where the broad ∩-shape becomes sharper and the punctated line is introduced. Cord-marking with Mulberry Creek Cordmarked, red slipping with Larto Red Filmed, and red-white-black polychrome painting are also introduced. Other ceramic artifacts found at Troyville sites include human effigy and slipped effigy vessels. Non-ceramic artifacts found at Troyville sites include small-stemmed projectile points (e.g., Gary or Maybon), which are indicative of the widespread use of the bow and arrow during this time.

*Coles Creek period.*The Coles Creek culture is a culture (an "in situ phenomenon") that emerged out of the Baytown period and the Troyville culture and, according to Williams and Brain, "is the most important prehistoric expression in the Lower Valley" (Williams & Brain, 1983, p.369). As a cultural period, it was devised by Ford based upon the ceramics recovered from the original Coles Creek site, now known as the Gordon site (22JE501). It is defined, according to Philips, as "beginning with the emergence of Coles Creek in the southern part of the lower Mississippi Valley and ending with the establishment of full-blown Mississippian culture in the northern part" (Philips, 1970, p. 18).

Settlement patterns of Coles Creek sites suggests they were located in the lower Red River, Tensas and lower Yazoo regions, and is considered to be "most impressive" for its "all-pervasive culture" due to its relative homogeneity throughout time and space (Philips, 1970, p. 369). Sites, it seems, are located in the most arable portions of the alluvial bottoms along the Mississippi and Yazoo rivers, as well as Deer Creek, and consisted of small sub-structural mounds arranged around an open area or plaza in what has been referred to as "a 'classic' mound triad" (Williams & Brain, 1983, pp. 369-371). These sites are thought to be local, non-residential ceremonial centers. Not all sites, however, have mounds and typically consist of small sites with a few dispersed houses. (Williams& Brain, 1983, p. 370). Settlement data, however, for the northern and eastern portions is lacking.

Diagnostic artifacts from this time frame continue to be ceramics and are characterized by distinctive pottery sets to include Reed 2, Sharfit, Valley Park, Vicksburg, Addis 1, Addis 2, Powell, Coker, and Yazoo 1. The type variety ceramics included in these pottery sets are Avoyelles Punctated, Chevalier Stamped, Coles Creek Incised, Chevalier Cord Impressed, French Fork Incised, Larto Red, Mulberry Creek Cordmarked, Mazique Incised, Carter Engraved, Beldeau Incised, Evansville Punctated, Harrison Bayou Incised, Hollyknowe Pinched, Anna Incised, and Carter Engraved. Non-ceramic artifacts include grooved plummets indicating use of ground-stone tools, Collins and Edwards points, scrapers, choppers, and abraders. Nevertheless, there seems to be a narrow variety in the lithic tool kit.

Subsistence practices during this time frame indicate, since sites are located in the previously mentioned alluvial bottoms, that some agriculture was taking place. While maize has been found at sites such as Rock Levee and Plum Bayou, it was not a major source of food until the very end of the Coles Creek period (Fritz, 1995; Fritz & Kidder, 1993; Roe & Schilling, 2010). Nevertheless, it seems that Coles Creek peoples intensively managed wild resources such as maygrass, chenopod, knotweed, acorn, fruits, fish, turtles and deer, tubers and seeds (Fritz, 1995; Roe & Schilling, 2010). Analysis of faunal remains from Lake George notes this and indicates the shift from generalized hunting and gathering.

During the Coles Creek period, mound construction, according to Williams and Brain, seems to be "one of the truly intriguing features of the Coles Creek culture . . . especially the type of mounds constructed and their arrangement" (Williams & Brain, 1983, p. 370). These mounds, which are considered sub-structural mounds, are modest in size, pyramidal in nature and presumed to be ceremonial in type. These mounds are thought to have been arranged around an open area or plaza, with structures built atop their summits them. It was thought that this type of arrangement burgeoned during the Coles Creek period. Mound centers became larger during this time, and this is thought to reflect "increasing status differentiation and, possibly, consolidation of authority and responsibility of individual leaders" (Fritz, 1995, p. 10). Mortuary data seems to indicate burials were in cemeteries, with little to no status differentiation or burial inclusion, as well as in the mounds themselves. Some of this data comes from the excavations of burials from Mound C at Lake George, but this data is limited to "a sample population count, burial-type description, estimations of age and sex distributions, morphological and metrical descriptions of the adult individuals and a discussion of the pathology exhibited and the general condition of the dental remains" (Egnatz, 1983, p. 421).

Aden phase. The earliest evidence for Coles Creek culture is revealed in the Aden phase at the Aden (22IS509) and the Lake George site (22YZ557). Although Aden is the type site for this phase, the initial dating of the site, although difficult to isolate due to minimal artifact representation, comes from Mound C at Lake George where the "first major constructional mantle" of the mound was dated to the beginning of the Aden phase around 800-900 A.D (Williams & Brain, 1983, p. 346). According to Williams and Brain, this phase "demonstrates direct continuity from the Bayland phase in the distribution of [its] components" (Williams & Brain, 1983, p. 370). The ceramics are the distinctive feature of this period.

Kings Crossing phase. The Kings Crossing phase is thought to be an intermediate or " 'middle phase' of an extraordinarily strong cultural continuity, it intergrades imperceptibly in both temporal directions, i.e., from the Aden phase on the one hand, and into the Crippen Point phase on the other" (Williams & Brain, 1983, p. 372). Ceramics continue to delineate the differences between the different phases.

Crippen Point phase. This phase, which was originally placed within the parameters of the Mississippian Period, was moved to the Coles Creek period and, as a result, became the terminal phase of the Cole Creek and the beginning of the emergent Mississippian period. Ceramic artifacts continue to demonstrate a direct cultural continuity; however, there seems to be a decline in the quality and technique of manufacture. As for the distributions of sites, there seems to be a shift in their distribution from the northeastern segment of the region in favor of an increase along the lower Deer Creek, which "served to strengthen the lower Yazoo-Mississippi axis . . . and may have been occasioned by the final stabilization of Deer Creek as it became less a raw distributary and more a typical tributary" (Williams & Brain, 1983, p. 374).

Peabody and Walnut Bend phases. Aside from presence of the distinctive ceramic assemblages, very little is known of these phases. It appears in the north that the Baytown culture continued, in spite of the fact that the Coles Creek culture was firmly established in the southern subarea. With regard to the distinctive ceramic assemblage, the Peabody phase is largely delineated by three ceramic types: Coles Creek Incised *var. Barner*, Shellwood Cord Impressed *var. Big Creek*, and French Forks Incised. Sam Brookes also considers Officer Punctate and Keo Incised to be diagnostic of this phase as well (Brookes, 1980). The Walnut Bend phase is defined on the basis of only one type, Wheeler Check Stamped (Philips, 1970, p. 914). Settlement patterns during the Peabody phase indicate sites are situated upon old natural levees away from the active Mississippi River channel (Brookes, 1980).

Adena and Hopewell Ceremonial Complexes

No discussion of the Woodland Period would be complete without mentioning the Adena and Hopewell ceremonial complexes. The Adena and the Hopewell Ceremonial complexes are particularly noted for their complex burial mounds and large earthworks. However, while Adena is perhaps best understood as a ceremonial and mortuary complex rather than a culture, the Hopewell are particularly noted for their complex cultural system. It goes without saying that these complexes affected the sociopolitical development of Woodland societies throughout much of the Southeast.

During the Woodland Period, these complexes, which were centered in the Ohio and Illinois River valleys, were the center of cultural development in eastern North America. The Middle Woodland Period in the Midwest and the Southeast, particularly in the Lower Mississippi Valley (LMV), is characterized by the advent of what is generally referred to as the Hopewellian Interaction Sphere. The Hopewell tradition, at its greatest extent, influenced prehistoric peoples that inhabited the entire Eastern Woodlands region from the Southeastern United States, including the LMV (Bense, 1994).

The Adena culture is important to understanding the Early Woodland period and the Marksville culture of the Lower Mississippi Valley, as it laid the foundation for the succeeding Hopewell culture. It has been argued by J. A. Ford and Quimby that the Adena Culture and the Tchefuncte culture, which preceded the Marksville culture, share "a typological similarity which suggests [there is] a cultural relationship between the two cultures" (J. A. Ford & Quimby, 1945, p. 92). Others have argued that the Adena-Tchefuncte connection lies with Poverty Point as "recession-driven Adena people themselves transferred from the Poverty Point nucleus up the age-old Mississippi trade-route to Ohio" (Covey, 2000, p. 67).

The Hopewell Interaction Sphere was widespread throughout the Southeast, and it has long been clear the Hopewell peoples left an indelible mark on its sociopolitical development and organization, particularly in the LMV (e.g., the transformation from Marksville culture to the Issaquena and Troyville cultures (Greengo, 1964; Mainfort & Walling, 1996). The (re)discovery of numerous burial mounds and their subsequent opening during the late nineteenth and early twentieth century, led to the unearthing and recovery of a distinctive set of mortuary items that displayed a marked uniformity wherever it was found. These assemblages included such things as copper earspools, copper beads, copper and silver panpipes, cut mica, galena, plain and zoomorphic effigy pipes and bowls, shell beads, freshwater pearls, worked animal bone, large carnivore incisors, greenstone celts, and most notably, a distinctive type of ceramics, which are clearly identified by ∩-shaped incised lines, curvilinear and rectilinear patterns of concentric loops, circles, and squares, and cross-hatched rims and zoomorphic designs (Phillips, 1939; Toth, 1988).

Conclusion

Archaeologically, the Yazoo Basin is the best known of all the physiographic regions in Mississippi. Its long and storied history is reflected in the many assemblages that have been recovered throughout the past decades and millennia but, as Phillips stated, "this record is a pale reflection of past reality, for this is of necessity almost entirely an archaeological record and so is subject to the usual limitations when the interpretation of cultural dynamics is attempted. Nevertheless, [as has been shown] certain patterns and events . . . had a major cultural impact" (Phillips, 1970, p. 386). It is necessary to understand where and how the Yazoo Basin fits within the prehistory of the Lower Mississippi Valley in that it virtually sits within its center. Because of where it is physically located, it influences and is influenced by the culture both in the north and the south and allows for contextual interpretations of cultural interactions on a large scale.

CHAPTER V

DATA COLLECTION, ANALYSIS METHODS, AND EXPECTATIONS

The archaeological investigation of Clark Lake took place in two different phases separated by several years. The first phase began in June 1999 when, as was previously explained, Dr. H. Edwin Jackson and his students excavated the site. The artifacts recovered from this excavation were analyzed in the lab; however, the results obtained from this analysis were never written up, and the data was lost when a former graduate student who was studying the ceramics from the site left the program. The next phase began in 2009 when I was given the site to reanalyze during my tenure as an intern for the Forestry Service. It is this reanalysis from whence this research project grew. This chapter outlines the field and laboratory data collection methods used to analyze the lithics from both excavations and specific emphasis is given to the lithic analysis methods, which is the primary focus of this research.

Field Methods

1999 Excavations

The archaeological investigation of Clark Lake took place during the month of June in 1999. A control grid using meters as the unit of measurement was established, and the site datum was located along a north-south baseline, which paralleled the trail. An arbitrary datum point was placed and originally designated N100 E100. From this arbitrary point, shovel test pits were laid out in a manner to best accommodate the landforms at 5-meter (m) intervals along transects spaced 5 m apart and mapped. The depth of each test pit varied between 30-50 centimeters below the surface (cmbs). In areas where the shovel test pits proved productive, additional shovel test pits were added at 5 m intervals in-between the original shovel test pits, essentially creating an alternating interval of every 2-3 m between each shovel test pit. Fifty-five shovel tests were excavated, and the matrix from each shovel test unit was dry screened through one-fourth inch hardware cloth.

Based on initial shovel test data, the limits of the site were greatly expanded particularly to the south, necessitating a redefinition of the datum point as N1000 E1000 and the subsequent renaming of excavations with this grid. Test units were laid out in areas of high artifact density, and the units were excavated in 10 cm arbitrary levels; the matrix was dry screened through one-fourth inch hardware cloth, as well. Excavation of a given unit ended after one or two sterile levels were completed, and it was carried out using shovels and trowels. Artifacts were bagged separately according to the level from which they were recovered and assigned a permanent catalog number. During the excavation of each level, the matrix was constantly examined for *in situ* diagnostic artifacts, as well as for anomalies such as soil discolorations. When an *in situ* diagnostic artifact was located, it was piece plotted by determining the horizontal and vertical dimensions, and then bagged separately.

Upon reaching the end of a level, the excavators completed level forms and any sub-surface anomalies were drawn in plan-view. Level forms were used to record conditions such as color and texture, the presence/absence of anomalies, class and density of recovered artifacts, as well as any other pertinent data. Each anomaly was monitored and examined in order to determine its origin and source of development and then mapped on grid-paper. When an anomaly was determined to have been due to a natural process, such as bioturbation, no further inspection was done. If it was determined to have been due to cultural origins, it was designated as a feature, and examined further. Features were hand-troweled and the matrix was screened separately. A detailed feature form was completed for each feature. Feature inspections typically involved determining its horizontal and vertical dimensions, mapping, recording, and photographing the feature, as well as collecting samples for carbon dating and/or flotation. Flotation samples were taken from each 10 cm level.

2009/2010 Excavations

In December 2009 and January 2010, further archaeological investigations were conducted in order to try to understand the nature and extent of the cultural processes that took place in the area that surrounded unit N1003 E1105. The original site datum set in 1999 could not be found, but its location was estimated and placed based upon the original notes. One 1 x1 meter (m) unit and thirteen 50 x 50 centimeter (cm) units were placed surrounding the original unit (Figure 11).

Units were excavated in 5 cm arbitrary levels, and the matrix was dry screened through one-eighth inch hardware cloth. Excavation of a given unit ended after one sterile level was completed, and it was carried out using shovels and trowels. Artifacts were bagged separately according to the level from which they were recovered and assigned a permanent catalog number. During the excavation of each level, the matrix was constantly examined for *in situ* diagnostic artifacts, as well as for anomalies such as soil discolorations. When an *in situ* diagnostic artifact was located, it was piece plotted by determining the horizontal and vertical dimensions and then bagged separately.

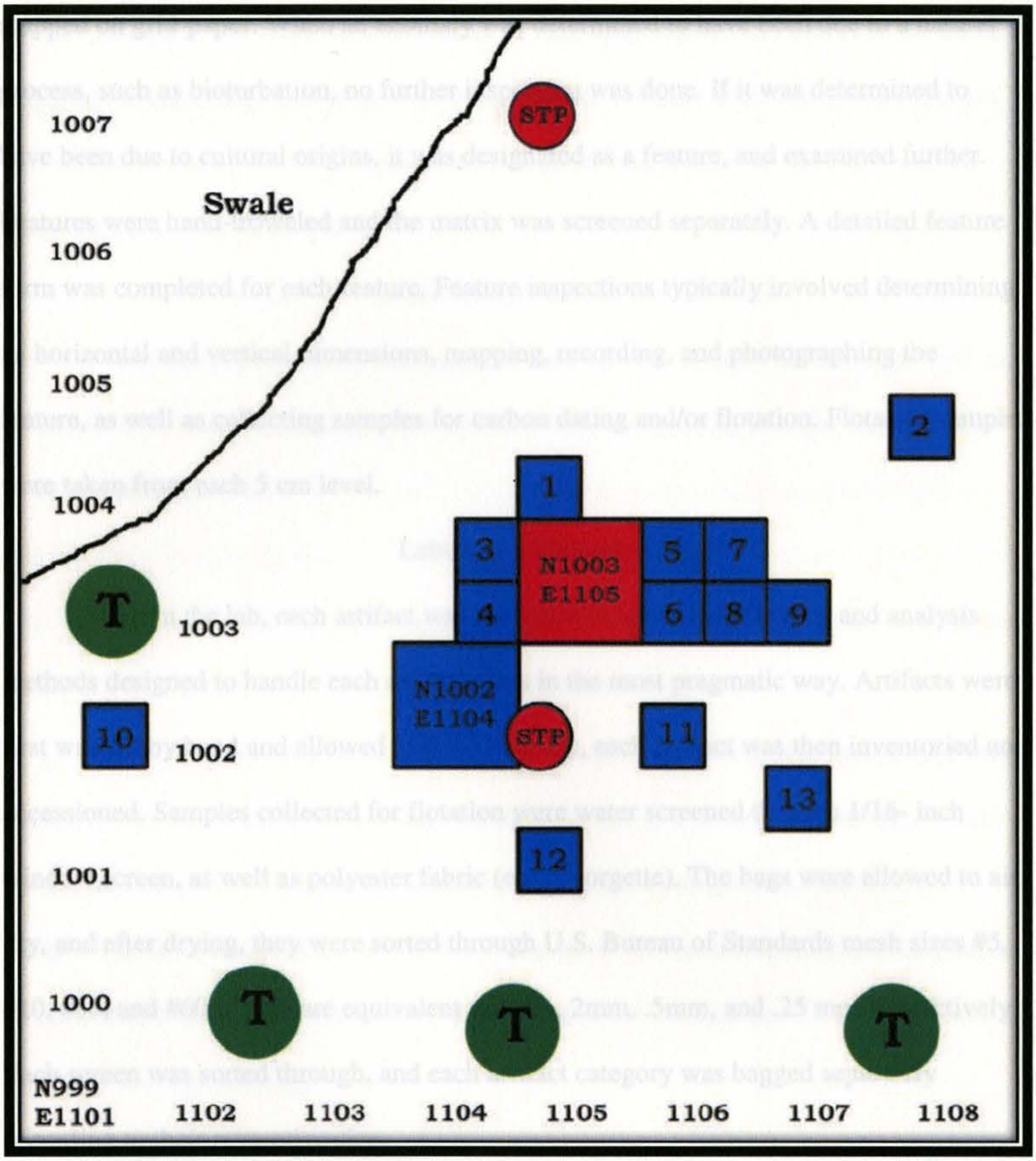

Figure 11. 2009/2010 Clark Lake Excavation Map.

Upon reaching the end of a level, the excavators completed level forms and any sub-surface anomalies were drawn in plan-view. Level forms were used to record conditions such as color and texture, the presence/absence of anomalies, class and density of recovered artifacts, as well as any other pertinent data. Each anomaly was monitored and examined in order to determine its origin and source of development and then mapped on grid-paper. When an anomaly was determined to have been due to a natural process, such as bioturbation, no further inspection was done. If it was determined to have been due to cultural origins, it was designated as a feature, and examined further. Features were hand-troweled and the matrix was screened separately. A detailed feature form was completed for each feature. Feature inspections typically involved determining its horizontal and vertical dimensions, mapping, recording, and photographing the feature, as well as collecting samples for carbon dating and/or flotation. Flotation samples were taken from each 5 cm level.

Laboratory Methods

Once in the lab, each artifact was subjected to specific laboratory and analysis methods designed to handle each artifact class in the most pragmatic way. Artifacts were first washed by hand and allowed to dry. Once dry, each artifact was then inventoried and accessioned. Samples collected for flotation were water screened through 1/16- inch window screen, as well as polyester fabric (e.g., georgette). The bags were allowed to air dry, and after drying, they were sorted through U.S. Bureau of Standards mesh sizes #5, #10, #35, and #60, which are equivalent to 4mm, 2mm, .5mm, and .25 mm, respectively. Each screen was sorted through, and each artifact category was bagged separately according to their respective size.

The ceramics were used to provide arbitrary dates for each of the levels according to Williams and Brain's (1983) ceramic typology. This typology, which is based upon their excavations at the nearby Lake George site, was used to identify what period each of the decorated pieces of ceramics belonged to (Williams and Brain 1983). The type of temper, the presence or absence of decoration, type of decoration, if present, thickness, and the portion of the vessel represented (e.g., rim, body, base) were recorded for sherds that had a recognizable interior and exterior surface. The type and variety of each sherd was recorded when possible. Fragmentary ceramics were labeled as *sherdlets*, and all obtainable data was recorded.

Lithic Analysis Methods

Lithic analysis involved the separation and identification of all flakes, as well as other modified stone. Generally, lithic artifacts were categorized as tools, reduced non-tools, or debitage.

Tools

Several different types of tools were identified during analysis on the basis of the following descriptions.

Projectile point. A projectile point is a bifacially worked finished stone tool with a pointed tip, which can be hafted onto a handle for use as a cutting tool, or onto a shaft for use as a projectile. Points were placed into diagnostic categories based on morphological characteristics such as size, shape, and production techniques. Diagnostic artifacts may provide information concerning periods of occupation, site function, and organization of technology.

Sandstone abrader. An abrader is used as a grinding stone or for softening hide.

Burnishing stone. A burnishing stone is used to smooth or polish ceramics.

Uniface. A uniface is defined as a tool flaked only on one side as a result of retouch for the purpose of producing knives, scrapers, and gravers.

Reduced Stone (Non-tools)

Reduced stone refers to artifacts that did not function as tools, so to speak; however, they do represent the remains of tool manufacturing activities. Artifacts that fall into this category include cores, flaked cobbles, split cobbles, and/or tested cobbles. These characteristics are arbitrary because they can overlap to a certain degree (i.e. a chert cobble with some flakes removed could be classified in each one of these categories).

Core. A core is a piece of material from which flakes or blades are struck to be used as tools. Cores can be either standardized (i.e., formal, prepared) or unstandardized (i.e. informal, amorphous, and unprepared). Standardized cores show a symmetrically patterned removal of flakes; unstandardized cores reveal a random reduction sequence that does not follow a predetermined pattern. This type of core technology is expedient in nature in response to immediate events that take shape.

Tested cobble. A tested cobble is a cobble with less than three flakes removed from the surface. The removal of the flakes is done to test the quality of the raw material. In spite of this, it is feasible that a *tested* cobble might have possibly functioned as a core that may have been lost or discarded after only a couple of flakes have been removed.

Split cobble. This is a cobble that has been broken as a result of percussion from knapping and it may be broken along any axis or split. It may have been broken on purpose to serve as a core. This type of cobble indicates the use of bipolar reduction techniques.

Lithic Debitage

The ultimate goal of the analysis of the lithic debitage from Clark Lake was to determine the lithic organization of the inhabitants who lived at Clark Lake by chronologically comparing the different types of tool technologies in order to characterize the settlement adaptation employed at this site. This study followed the procedure presented by Bradbury and Carr (1995) and originally set forth by Magne (1985). This methodology presented a distinct set of attributes that, when recorded and compared, revealed patterns that were useful in determining site function. Key attributes, such as size grade, weight, raw material, portion, striking platform, platform facet counts, cortex, dorsal scars, heat alteration, modification, and reduction stage were used because they provided the most accurate and reliable information pertaining to prehistoric behavior patterns relating to the organization of lithic technology.

Each individual flake was passed through size-graded sieves, and analyzed with the aid of a 40-x microscope to observe the attributes. The attributes recorded for each piece of debitage is listed, along with the options within each variable.

Size Grade. Size grade was used to make inferences about the range of reduction activities, such as reduction stage, production/reduction activities, and organization (Ahler, 1989; Shott, 1994) that took place at Clark Lake. A relatively homogeneous assemblage (predominantly one-fourth inch or less) indicates a narrow range of knapping activities, while a relatively heterogeneous assemblage (e.g., flakes of all size grades) implies a much more diverse and broad range of knapping activities, such as tool manufacture and maintenance. It was determined by nesting screens of various sizes and shaking the flakes through the screen until all of the flakes are completely separated into one of the five screen sizes. Categories for size grades include:

- Size Grade 1: $\geq$ 2.5cm (1 inch)
- Size Grade 2: 1.27cm to 2.5 cm (1/2 - 1 inch)

- Size Grade 3: .64 cm to 1.27 cm (1/2 - 1/4 inch)
- Size Grade 4: .32 cm to .64 cm (1/8 – ¼ inch)
- Size Grade 5: ≤ .32 cm

Weight. Weight of each flake was recorded to a hundredth of a gram. As with size grade, weight is an important indicator of the range of reduction activities, such as reduction stage and the manufacture and maintenance of tools, taking place within the site, as well as the initial size of the nodules and cobbles prior to reduction activities. A relatively homogenous assemblage (e.g., debris weighing .5 grams or less) may indicate a fairly restricted range of knapping behaviors, such as tool maintenance or primary reduction, while a heterogeneous assemblage (e.g., a variety of individual debris weights) may indicate a wide range of tool manufacturing and maintenance behaviors.

Raw Material. Raw material type was used to make inferences about procurement strategies, mobility of prehistoric populations, and trade of non-local material, as well as the range of reduction activities taking place within the site. Homogeneous assemblages reflect a more restricted range of reduction activities, while a heterogeneous assemblage may reflect a more diverse range of stone tool manufacture and maintenance. Seasonality of occupation was also considered as a factor in the exploitation and quantities of specific materials, since materials may have been procured during *off-site* seasonal rounds and activities and hauled back to the site in question when it was reoccupied. Among the different types of raw material recovered from the site are Citronelle gravel chert, Tallahatta Quartzite, White and Clear Quartz, Silicified Sandstone, Coastal Plain chert and Burlington chert. The use of the comparative collection curated at The University of Southern Mississippi was used to aid in material identification.

Portion. When the flakes were analyzed, portion, or how much of the flake was present, was used based upon the following categories: whether the flake was whole or complete, proximal with the platform, medial, distal, or non-orientable debris or shatter. Medial flakes were classified on the basis of neither having a bulb of percussion nor a feather termination due to breakage. Distal flakes were classified on the basis of whether the flake exhibited a feather termination and lacked a bulb of percussion. Non-orientable debris or shatter includes blocky shatter or chunks that lack flake characteristics such as a dorsal or ventral side.

Platform. A striking platform is the area on which force is applied to detach a piece of material. Platform types include crushed, flat, cortical, lipped, cortical-lipped and eroded, and they are used to reveal information concerning the different reduction stages and how the lithics are manufactured. Platforms that consist of the outer layer or cortex of a stone are assumed to be from the early stage of reduction as opposed to non-cortical or lipped platforms that are indicative of late stage reduction. Hard hammer percussion usually results in crushed platforms due to the heavy force of the blow, and lipped platforms are usually associated with soft hammer percussion. Flat platforms are usually indicative of manufacturing non-bifacial tools from amorphous cores.

Platform facet count. Platform facets usually provide reduction stage information as well. The higher platform facet count is indicative of late stage reduction, while the smaller facet count usually indicates an early stage of reduction. This is mediated by flake size. Early stage reduction is assigned if 0-1 facets are present. Middle stage reduction is assigned if two facets are present, and late stage reduction is assigned if three or more facets are present.

Dorsal scar count. Dorsal scars are the impressions found on the dorsal surface of a flake and are caused by the removal of previous flakes. Dorsal scar counts estimate the number of flakes previously removed from a core or biface and can also determine the different reduction stages. It, too, is mediated by flake size and has been determined to be the single best attribute for non-platform bearing flakes. A low number of dorsal scars are supposed to represent the early stages of reduction, whereas a higher number is generally thought to represent the latter stages of reduction. Early stage reduction is assigned if 0-1 dorsal scars are present. Middle stage reduction is assigned if two dorsal scars are present and late stage reduction is assigned if three or more dorsal scars are present.

Cortex. The cortex or the outer layer of the cobble or pebble left on the flake is correlated with the reduction stage and manufacture of stone tools. Four categories are assigned on the basis of how much cortex is shown on the dorsal side of the flake:

- 0 = no cortex showing
- 1 = 1-49% cortex showing
- 2 = 50-99% cortex showing
- 3 = 100% or complete cortex coverage.

The more cortex left on the flake represents the early stages of reduction and little to no cortex is believed to be the latter stages of reduction. Raw material and size must be taken into account when considering cortex as a reduction stage indicator.

Heat alteration. The presence or absence of heat alteration was recorded for each flake based upon a color change, a waxy vitreous luster, or damage to the flake as a result of intentional or unintentional exposure to fire. The following categories were assigned:

- 0 = no heat alteration

- 1 = heat alteration
- 2 = heat damage

Modification. Categories for modification are retouch and utilization. All flakes were analyzed under a microscope for evidence of microflake removals or altered edges. Information about site function and the organization of technology can be inferred from the modification of flakes. Utilized flakes include those struck from an amorphous core and are, in general, associated with expedient tool technology. Retouched flakes are flakes that are purposely flaked to increase use life or modify the edge angle and shape. A high degree of modification may indicate the presence of long-term residential activities (Parry & Kelly, 1987). Modification of flakes is related to the availability of raw material, mobility and settlement adaptation (Binford, 1979).

Reduction stage. Reduction stages are assigned on the basis of the combination of a number of different attributes such as dorsal scars, platform facets, and cortical coverage as outlined above. Reduction stage categories include Early Stage, Middle Stage, and Late Stage flakes, as well as biface thinning flakes, angular shatter, and eroded or indiscernible specimens. Even though reduction stages should be considered as a continuum rather than as discrete stages, the assignment of stages to the flakes helped to determine what the different type of activities taking place at the site were, as well as what types of tools were being manufactured and maintained. Early stage reduction is generally associated with the initial stages of biface reduction and core reduction. This stage was assigned if zero to one platform facets were present on complete and proximal flakes. Middle stage reduction is associated with the refining of bifacial tools. This stage was assigned if two platform facets were present. Late stage reduction is associated with the final steps of tool manufacturing and maintenance. This stage was assigned if three or more platform facets were present. For medial or distal flakes the assignment of stages was based upon the number of dorsal scars present. Zero to one dorsal scars indicated Early stage reduction, two dorsal scars indicated Middle stage reduction, and three or more dorsal scars indicated Late stage reduction. Biface thinning flakes, which are indicative of Late stage manufacturing, have distinctive attributes that make them distinguishable from interior flakes. They are normally thin and twice as long as they are wide, exhibit a feathered distal end and retain the platform on the proximal end. As a rule of thumb, anything less than one-fourth inch was not considered to be a biface thinning flake, but rather considered to be remnants of edge trimming and maintenance. Angular shatter included blocky pieces and other debris pieces that lacked flake characteristics such as an identifiable dorsal or ventral side. These were interpreted as byproducts of core reduction.

Archaeological Implications and Expectations for Prehistoric Settlement Systems

Previous studies of prehistoric settlement systems have provided a basis for making predictions or inferences concerning site formation processes and lithic assemblages. As previously discussed in Chapter II, the residential/logistical model as described by Binford (1979) produces different types of sites and assemblages and varying technological organizations in relation to the environment in which people live. By analyzing the organization of the lithic assemblage, a connection can be made between the type of site and the types of tools being manufactured at the site in order to identify prehistoric settlement patterns.

As previously discussed, foragers/collectors produce different site types, such as residential base camps and locations, to which its inhabitants are tethered. Each site type produces varying archaeological tool assemblages and should reflect either a curated or expedient tool technology, depending on the different prehistoric settlement patterns.

Differences in these assemblages may reflect a shift in the mobility of hunter-gatherers through time and space to a more sedentary settlement pattern. This shift in settlement and mobility is believed to have taken place during the Middle Woodland period in the Southeast and is thought to have occurred as a result of the increase in population levels and the regional variation of the environmental structure (Johnson, 1993). This also caused a shift in the organization of technology. These changes can often be seen in the archaeological record as a result of site formation processes and stone tool technologies.

Expectations for Residentially Mobile Forager Adaptations

According to Kelly (1988), a low amount of personal curated tools and a high amount of expedient flake tools are expected to be found in the archaeological assemblages of residential base camps inhabited by highly mobile foragers. Curated tools should be manufactured from high quality, non-local raw materials because the type of material used lengthens the use-life of a particular tool. This is significant for a forager adaptation due to the randomness of raw material sources. To prolong the use-life of a particular tool, a bifacial tool technology may be used to conserve the high-quality material and reduce carrying costs. Large bifaces can be used as supply material for other curated tools to be manufactured from, as well as be used as functional tools. Expedient tools may be manufactured from the local chert sources in and around the general foraging area, and as curated tools are worn down and replaced, may be used to manufacture new, curated tools.

The manufacture, repair, and discard of tools at a residential base camp should produce a high diversity of evenly distributed tool types since the camp is where the center of activities takes place within a hunter-gatherer system. Lithic debitage representing all stages of manufacture and maintenance should be found throughout the habitation site in moderate to high frequencies. A large amount of middle- to late-stage reduction debitage from non-local raw material sources may reflect higher than expected middle to late stage debris due to the functional shape and initial trimming of cores. A large amount of early- to middle-stage reduction debitage from local raw material sources should reflect the use of expedient tools. Also included in the assemblage, should be a moderate to high degree of site furniture to include hearthstones, grinding stones, cooking stones, and anvils (Binford, 1979; Chatters, 1987; Nelson, 1991).

On the other hand, locations created by a foraging adaptation should produce primarily expedient tools manufactured from local raw material, and the debitage should be represented by early stage flakes from the reduction of cores. Again, high quality raw material should be used for the manufacture and maintenance of specialized tools. There should be very little, if any, non-local debitage present from the manufacture of tools. There should also be a low frequency of specialized tools and broken or damaged personal gear.

Expectations for Logistically Organized Collector Adaptations

Curated tools designed for reliability or for specific tasks are expected to be found in the archaeological assemblages of residential base camps inhabited by logistically organized collectors. Tool assemblages should be diverse, reflecting the multi-functional nature of a residential site. The curated tools, including bifacial cores, are manufactured from either low or high quality raw material, and are considered "high-energy investments" because they can be used as cores, long use-life tools, and as a by-product of the shaping process (Kelly, 1988, p. 718). They would be represented in the archaeological record as biface-reduction flakes and as discarded, exhausted bifacial tools.

On the other hand, expedient tools are made from local raw material sources and represent a core reduction technology. This type of technology results in a large amount of early stage and shatter debris found in an archaeological assemblage (Carr, 1994).

A reduction in mobility and territorial ranges affects the use of local versus non-local material in the production of stone tools. Hunter-gatherers may have increased their reliance on local raw material sources, thus producing a wide range of flakes from all reduction stages and increasing the manufacture of curated tools. The multi-functional nature of a residential base camp should be reflected in the diverse nature of the archaeological assemblage.

The acquisition of raw material, as explained by Binford (1979), is embedded in the subsistence practices of hunter-gatherers. If high quality raw material is available locally, the material will be obtained as a result of normal procurement activities. They do not go out for the expressed and exclusive purpose of obtaining raw material for tools unless something has gone wrong (Binford, 1979).

Collector locations are typically task specific, and the assemblages found usually reflect their task specific nature and are characterized by a curated tool technology manufactured from high quality raw material. Tools should be manufactured and repaired prior to a logistical foray. These location camps should produce debitage from the late stages of reduction resulting from resharpening and maintenance or repair of tools, with a larger amount of early stage flakes from the manufacture of expedient tools. Broken tools may be part of the assemblage.

Debitage from the manufacture and maintenance of task specific tools should be reflected in the assemblage recovered from collector camps. Flakes should reflect the middle to late stages of reduction. There should be a low frequency of personal curated tools to include preforms, rejects, as well as a moderate frequency of failures.

Expectations for Cultural Behavior

A second part of the analysis is consideration of the logistical distribution of debitage in the excavation of the units to assess site formation processes represented by the non-random scattering of artifacts in relation to features,, and post molds throughout the site. The frequency and density of artifacts, as well as features, can dramatically vary from one area to the next, which can be attributed to the archaeological patterning of segregated activities of the inhabitants of a site (Metcalf & Heath, 1990). High concentrations of flakes from areas with low to no concentrations of flakes can be representative of specific types of cultural behavior(such as sweeping up of debris, cleaning of a hearths, etc.) of the inhabitants of a site and that these behaviors could be reflective of their mobile or sedentary nature. Since activities and site functions vary, this variability should be detectable in the archaeological record through a discrete clustering of materials. From this clustering of materials, similar patterns regarding activities should emerge. This pattern can also be affected by the relative amount of time a site has been occupied. By looking at the spatial patterning of artifacts at a site, these patterns can emerge.

CHAPTER VI

RESULTS

In this chapter, a discussion of the recovered artifact inventory is presented. This is followed by the results of the technological analysis of the Clark Lake lithic assemblage. This includes an examination of all lithic artifacts, including formal stone tools, reduced stone tool implements, ground stone implements, and lithic debitage recovered from both the 1999 and 2009/2010 investigations.

Chronological and Stratigraphic Analysis

The archaeological record of the Clark Lake site contains artifacts that indicate this site was repeatedly occupied beginning during the Tchula period, which began around 500 B.C., during the Early to Middle Woodland period, and continued to be repeatedly occupied until the Lake George phase, which ended around 1500 A.D during the Mississippian period, around the time of contact with Europeans. Archaeological deposits range from the surface up to a maximum depth of 50 centimeters below the surface (cmbs).

In order to understand stratigraphic integrity at Clark Lake, this discussion must be divided into two separate discussions based upon the different excavation episodes because the units were excavated using different integrity level controls. In 1999, units were excavated in arbitrary 10-centimeter levels, and in 2009/2010, units were excavated in in 5-centimeter levels below the first 10 centimeters. With regard to the 1999 excavations, based upon the spatial relationships among the temporally diagnostic ceramics, it is unclear whether the deposits are chronologically well stratified, and it appears as if some mixing from natural processes such as bioturbation from flora and fauna, alluvial, colluvial or eolian processes, or cultural processes, such as plowing, digging, and deforestation, has taken place. However, this may not be the case because of the shallow excavation depths of the units, as well as the wide temporal span of the ceramics that were found in one 10-centimeter level.

Based upon this evidence, in order to get a better handle on the temporal span of the site, a decision was made to excavate units in arbitrary 5-centimeter levels during the 2009/2010 excavations. From these excavations, it appears that these deposits are chronologically well stratified and have suffered minimal disturbance from natural or cultural processes.

Nevertheless, the exact nature of the depositional and post-depositional processes that took place at Clark Lake is not fully understood. Perhaps, the most important factor that helped to contribute to the site's depositional processes is the site's geomorphological features. Clark Lake is located in a floodplain forest, and, as such, is subjected to continual erosional and depositional processes. A floodplain develops a complex array of geomorphological features such as meandering river channels that transport, erode and deposit alluvial sediments, natural levees, point bars, ridges and swales, oxbow lakes, sloughs, backwater deposits, and terraces. Of these geomorphological features, one is clearly significant to Clark Lake: the oxbow lake. Clark Lake, for which the site is named, is an oxbow lake. An oxbow lake forms as a result from the cutoff of river channel meanders, and from this cutoff, deepwater alluvial swamps often develop. These deepwater alluvial swamps are typically influenced by seasonal river flooding from nearby rivers such as the Sunflower and the Yazoo Rivers, which surrounds Clark Lake on three sides. One unique characteristic of deepwater alluvial swamps is that, because of the seasonal flooding and isolation from the river for most of the year, they have relatively high levels of ions, such as magnesium, which tends to attach itself to artifacts and form concretions around them, and sometimes, even replacing the organic material. Many of these types of concretions were found in areas of high artifact density throughout all levels of excavation. Alluvial and eolian processes may also be responsible for the accumulation of cultural remains at Clark Lake; however, to what extent is unknown (Sharitz & Mitsch, 1993).

Diagnostic Artifacts and Chronology of Clark Lake

Over 5,653 prehistoric artifacts were recovered from Clark Lake from both excavations. This total includes 3,369 pieces of decorated and undecorated ceramics representing the Tchula, the Early, Middle, and Late Woodland, Emergent Mississippian and Mississippian periods, as well as 667 pieces of bone or bone fragments, over 554 botanical remains, 48 pieces of baked clay (one of these with a forefinger and thumbprint impression), and 998 pieces of lithic debitage. Chipped-stone tool diagnostics recovered from Clark Lake include two projectile points that represent the Issaquena phase of the Middle Woodland period and the Deasonville phase of the Late Woodland. Other lithic artifacts include two sandstone abraders, a burnishing rock, an attempted core, and two broken PP/K fragments, as well as 144 pieces of andesite and basalt ground stone tool microdebitage. Informal expediently manufactured flake tools recovered from the site include two expediently manufactured flake tools.

Ceramic Analysis

The Clark Lake ceramic assemblage consists of a total of 6,192 pieces of ceramics. This count includes both decorated and undecorated ceramic rims, bodies, bases, and sherdlets. At 72.8% of the assemblage, the ceramic assemblage consisted mostly of Middle to Late Woodland phase ceramics. Of this 72.8%, 92.5% of the assemblage is clearly affiliated with the Issaquena phase of the Marksville period. This ceramic affiliation includes Baytown Plain, Marksville Incised, Marksville Stamped, Churupa and Evansville Punctated, as well as Hollyknowe Ridge Pinched and Indian Bay Stamped ceramics. The other 27.2% of the decorated ceramics is associated with the Late Woodland and Mississippian periods. These later ceramics include Anna Incised, Baytown Plain *var. Addis,* Carter Engraved, Coles Creek Incised, Evansville Punctated, French Fork Incised, Harrison Bayou Incised, Leland Incised, Mazique Incised, and Parkin Punctated.

Beyond assessing cultural affiliation, the percentage of decorated to undecorated ceramics helps to assess site function. Since decorated sherds comprise only 2.77% of the entire ceramic assemblage, this indicates vessel decoration was rare. It has been argued that the ratio of decorated to undecorated ceramics at sites reflects ceramic function, with decorated ceramics being reserved for ceremonial purposes and plain ceramics for everyday usage. The ratio of decorated to undecorated ceramics is 1:36 indicating that Clark Lake was not used for ceremonial purposes, but was instead a residential camp. From this context, it is inferred that the ceramics recovered from the site were used for storage or cooking.

Formal Stone Tool Analysis

A total of two projectile points (Figure 12) and two PP/K fragments were recovered from excavation units. One of the projectile points was manufactured from Burlington chert and the other from Citronelle gravel chert. Projectile point classification

Figure 12. *Edwards Stemmed var. Spanish Fort (L) and Gary Stemmed var. Gary (R).*

relies on a number of morphological attributes including notching type, hafting elements, blade shape, and general size of the point. Table 4 provides the summary of information regarding provenience, type, material, and metric data for each specimen

Table 4

Projectile Point/Knives and Fragments Recovered from Clark Lake

	Unit	Lvl	Type	Mat.*	Wt. g.	Len.** cm	Wth cm	Thickness cm
1.	N1110 E1095	STP	Gary Stemmed *var. Gary*	CG	16.43	(7.3)	4.0	(nt)
2.	N1140 E1100	STP	Edwards Stemmed *var. Spanish Fort*	BC	7.73	(4.9)	2.8	(nt)
3.	N1003 E1105	10-20	Frag., Distal end	CG	2.05	2.5	.9	1.8
4.	N1003 E1105	20-30	Frag. Distal End	CG	1.66	1.7	1.9	.7

* CG = Citronelle Gravel Chert ; BC = Burlington Chert
** Measurements in parentheses are incomplete dimensions on broken specimens.

Middle to Late Woodland. One PP/K has been classified as Gary Stemmed *var. Gary*, and one PP/K has been classified as Edwards Stemmed *var. Spanish Fort* (Figure 12). The Gary point is diagnostic of the Issaquena phase, and the Edwards point is diagnostic of the Deasonville phase, both of which are clearly representative of the Middle to Late Woodland periods (Greengo, 1964; Phillips, 1970; Williams & Brain, 1983). The Edwards point is manufactured from Burlington chert and the Gary point is manufactured from Citronelle gravel chert. Both exhibit some erosion and weathering, as well as showing considerable wear. Both specimens are missing the distal end, suggesting breakage in use or resharpening. The level at which these two points were found is unknown since they were recovered from a shovel test pit (STP).

Gary Stemmed *var. Gary* points are typically 6 to 8 cm long and 2.8 to 3.8 cm wide at the shoulders. The stems are contracting, the shoulders are well defined and the bases are rounded. The materials for this point tend to be exotic: pink-tan-grey-banded chert (possibly Coastal Plain chert), gray-white-mottled quartzite, red-and-brown speckled novaculite, and gray and pink novaculites (Williams & Brain, 1983).

Edwards Stemmed *var. Spanish Fort* points are typically 4.4 cm to 6 cm in length and 1.5 to 2.5 cm in width at the shoulders. The thickness is usually from .5 cm to 1 cm. It has been characterized by Phillips as having a "broad rectangular stem" (Phillips, 1970, p. 311). Ususally the materials for this point type are locally available, heat-treated chert.

PP/K fragments. Two fragments were identified during the lithic analysis. Both were manufactured from Citronelle gravel chert. One of the fragments appears to have been broken during initial manufacturing since it appears to be incomplete because one side has not been flaked and exhibits a cortical face. The other fragment appears to have been broken from a lateral snap during resharpening at the point of an imperfection in the stone. The partially complete PP/K was recovered in the 10-20 cmbs level. The other was recovered in the 20-30 cmbs level. The cultural affiliation of each specimen is unknown.

Other Chipped, Reduced, and Ground-stone Tool Analysis

In addition to the aforementioned diagnostic stone tools, a small number of other stone tools and implements were recovered at Clark Lake. These tools include two sandstone abraders, a hafted end scraper, a burnishing rock, one core, and a tested cobble.

Sharpener/Abrader. One bone tool sharpener and one abrader were identified during the lithic analysis. Stone abraders serve as a file, hone, or whetstone in sharpening bone tools, shaping wood, or working other stones. They are usually made of an abrasive granular type of stone, such as sandstone. They are not typically purposefully or specially shaped or prepared. Usually they are small enough so that it is convenient to hold in the hand. Some of these abraders exhibit extensive usuage wear in the form of grooves or worn surfaces. The sandstone abraders found at Clark Lake display these characteristics. One abrader exhibits a circular type of notch in the upper corner and the other is worn completely flat on one side. The level at which these two abraders were found is unknown since they were recovered from a STP.

Burnishing stone. Smoothing, burnishing or polishing of ceramic surfaces is often done to conceal irregularities on the vessel surface or to alter the vessel's appearance.This is often accomplished by using a hard tool, such as a stone, to rub the surface of a partly dried vessel. One small stone with a highly polished surface one one side was recovered from the 25-30 cmbs level of Unit N1002 E1101.5.

Unifacial scraper. One hafted end scraper was recovered from Clark Lake; however, it was not included in the lithic analysis since its was found out of context on the surface alongside the trail that is frequently used by hikers, hunters, and ATV users to reach Clark Lake.

Cores. Two cores were recovered, both of which are Citronelle gravel. One specimen (16.1g) is classified as amorphous, and the other (47.73g) is classified as a tested cobble. It, too, is amorphous. The first specimen was not included in the lithic analysis because it was recovered from alongside the trail with the hafted end scraper. The second specimen was recovered from Unit N1003 E1105, where the large amount of lithic debitage, which will be discussed later, was found.

Lithic Debitage Analysis

Raw materials and size grade. A total of 998 pieces of lithic debitage reprsented by an array of raw materials was analyzed for this lithic analysis (Table 5).The majority (80.3%) of the lithic debris resulted from knapping Citronelle gravel chert (N=801). In addition to Citronelle gravel chert, andesite (10.8%) and basalt (3.6%) were the next highest contributions to the assemblage. Other materials were represented in the assemblage; however, these contributions were relatively small. These materials included white quartz (1.4%), Burlington chert (1.3%), clear quartz (1%), Tallahatta Quartzite (.5%), Coastal Plain chert (.5%), other types of quartz to include pink and smokey (.4%), a pink type of rock with veins (.1%), and petrified wood (.1%).

All size grade categories are represented in the lithic assemblage (Table 5). The majority (45%) of debitage (N=447) measured between 12 mm (one half inch) and 6.4 mm (one-fourth inch). The next largest size category (28%) of debitage (N=276) measured less than 3.2mm (one-eighth inch), followed by debitage (25%) that measured between 6.4 mm and 3.2mm (N=245), and only 29 (3%) pieces of debitage measured between 12 mm and 24 mm (one half – one inch). Of these, 27 were Citronelle Gravel

Table 5

Distribution of All Raw Materials by Size Grade

Raw Material	1 >24mm	2 24-12mm	3 12-6.4mm	4 6.4-3.2mm	5 <3.2mm	Total
1. Citronelle Gravel	1	27	432	227	114	801
	0.1%	3.4%	53.9%	28.3%	14.2%	80.3%
2. Andesite	0	0	0	0	108	108
	0.0%	0.0%	0.0%	0.0%	100.0%	10.8%
3. Basalt	0	0	0	2	34	36
	0.0%	0.0%	0.0%	5.6%	94.4%	3.6%
4. White Quartz	0	0	3	3	8	14
	0.0%	0.0%	21.4%	21.4%	57.1%	1.4%
5. Burlington Chert	0	1	5	5	2	13
	0.0%	7.7%	38.5%	38.5%	15.4%	1.3%
6. Clear Quartz	0	0	1	3	6	10
	0.0%	0.0%	10.0%	30.0%	60.0%	1.0%
7. Tallahatta	0	1	2	2	0	5
	0.0%	16.7%	33.3%	33.3%	0.0%	0.5%
8. Coastal Plain	0	0	4	1	0	5
	0.0%	0.0%	80.0%	20.0%	0.0%	0.5%
9. Other Quartz	0	0	0	0	4	4
	0.0%	0.0%	0.0%	0.0%	100.0%	0.4%
10. Pink w/veins	0	0	0	1	0	1
	0.0%	0.0%	0.0%	100.0%	0.0%	0.1%
11. Petrified Wood	0	0	0	1	0	1
	0.0%	0.0%	0.0%	100.0%	0.0%	0.1%
Total	1	29	447	245	276	998
	0%	3%	45%	25%	28%	100%

chert, one was Burlington chert, and the other was Tallahatta Quartzite. Only one complete flake of Citronelle gravel chert measured greater than 24 mm (one inch). These numbers reflect the site as a whole. Sampling error is a problem with the total assemblage because one-fourth inch screen was used during the 1999 excavations, and one-eighth inch screen was used during the 2009/2010 excavations. With this in mind, it becomes necessary to separate the two excavations and discuss each one individually.

For the 1999 excavation, a total of 649 pieces of lithic debitage representing an assortment of raw materials was analyzed (Table 6). The majority (97.4%) of the lithic debris resulted from knapping Citronelle gravel chert. Of the remaining 17 specimens, five were Tallahatta Quartzite (.8%), five were Burlington chert (.8%), three were Coastal Plain chert (.5%), two were white quartz (.3%), one was clear quartz, and one was petrified wood (.2%). Table 6 provides a summary of the distribution of all raw material from this excavation.

Table 6

1999 Distribution of Raw Materials by Size Grade

Raw Material	1 >24m	2 24-12mm	3 12-6.4mm	4 6.4-3.2mm	5 <3.2mm	Total
1. Citronelle Gravel	1 0.2%	19 3.0%	411 65.0%	186 29.4%	15 29.4%	632 97.4
2. Tallahatta Quartzite	0 0.0%	1 20.0%	2 40.0%	2 40.0%	0 0.0%	5 0.8%
3. Burlington Chert	0 0.0%	1 20.0%	1 20.0%	3 60.0%	0 0.0%	5 0.8%
4. Coastal Plain Chert	0 0.0%	0 0.0%	3 100.0%	0 0.0%	0 0.0%	3 0.5%
5. White Quartz	0 0.0%	0 0.0%	2 100.0%	0 0.0%	0 0.0%	2 0.3%
6. Clear Quartz	0 0.0%	0 0.0%	1 100.0%	0 0.0%	0 0.0%	1 0.2%
7. Petrified Wood	0 0.0%	0 0.0%	0 0.0%	1 100.0%	0 0.0%	1 0.2%
Total	1 0.2%	21 3.2%	420 64.7%	192 29.6%	15 2.3%	649 100

All size grade categories are represented in the lithic assemblage for the 1999 excavation (Table 6). The highest majority (64.7%) of flakes (N=420) measured between 12mm (one-half inch) and 6.4 mm (one-fourth inch), followed by the next highest majority (29.6%) of flakes (N=192), which measured between 6.4 mm and 3.2 mm (one-eighth inch). Of the remaining 37 flakes, 21. (3.2%) measured between 24 mm (one inch) and 12 mm (one-half inch), and 15 (2.3%) measured less than 3.2 mm (one-eighth inch). As was previously discussed, there was only 1 Citronelle gravel flake that measured greater than 24 mm.

A total of 349 pieces of lithic debitage representing an assortment of raw materials from the 2009/2010 excavation was analyzed (Table 7) . The majority (48.4%)

Table 7

2009/2010 Distribution of Raw Material by Size Grade

Raw Material	1 >24mm	2 24-12mm	3 12-6.4mm	4 6.4-3.2mm	5 <32.mm	Total
1. Citronelle Gravel	0 0.0%	8 2.3%	21 6.0%	41 11.7%	99 37.9%	169 48.4%
2. Andesite	0 0.0%	0 0.0%	0 0.0%	0 0.0%	108 30.9%	108 30.9%
3. Basalt	0 0.0%	0 0.0%	0 0.0%	2 0.6%	34 9.7%	36 10.3%
4. White Quartz	0 0.0%	0 0.0%	1 0.3%	3 0.9%	8 2.3%	12 3.4%
5. Clear Quartz	0 0.0%	0 0.0%	0 0.0%	3 0.9%	6 1.7%	9 2.6%
6. Burlington Chert	0 0.0%	0 0.0%	4 1.1%	2 0.6%	2 0.6%	8 2.3%
7. Other Quartz	0 0.0%	0 0.0%	0 0.0%	0 0.0%	4 1.1%	4 1.1%
8. Coastal Plain Chert	0 0.0%	0 0.0%	1 0.3%	1 0.3%	0 0.0%	2 0.6%
9. Pink w/veins	0 0.0%	0 0.0%	0 0.0%	1 0.3%	0 0.0%	1 0.3%
10. Total	0 0%	8 2.3%	27 8%	53 15%	261 75%	349 100%

of the lithic debris resulted from knapping Citronelle gravel chert, followed by 108 (31%) blocky fragments of Andesite, and 36 (10%) pieces of Basalt (the identification of which was aided by The University of Southern Mississippi's Department of Geography and Geology). Other raw materials included in this assemblage, but in rather small amounts are white quartz (3.4%), Burlington chert (2.3%), clear quartz (2.6%), Coastal Plain chert (.6%), pink and smokey quartz (1.1%), and a pink type of rock with veins (.3%). These small amounts of exotic material indicate that some form of long distance trade was taking place.

For the 2009/2010 excavation, only size grades 2 through 5 are represented in this lithic assemblage (Table 7). The majority (75%) of debitage in this assemblage measured less than 3.2mm. The next highest proportion (15%) measured between 6.4 mm and 3.2 mm, followed by size grade 3, which measured between 12mm and 6.4mm, and, finally, size grade 2, which measured between 24mm and 12mm. The large amount of debitage recovered from size grade 4 and size grade 5 indicates that the use of one-fourth inch screen during the screening process shows that some important data may be lost or sacraficed for ease and expediency in excavations, and sampling errors may occur. It should also be noted that 238 of the 261 of the blocky fragments, which includes Andesite and Basalt, were recovered from flotation samples rather than through the normal one-eighth inch screening process, further indicating that taking flotation samples is important to archaeological excavationsbecause what is not recovered during the screening process may be recovered during flotation, which may serve to lessen or limit sampling errors.

Weight. All complete and proximal flakes were weighed (Table 8). The majority of flakes were caught in the size grade 3 screens, followed by size grade 4, size grade 2, and size grade 1. Average flake weight in the size grade 3 or one-fourth inch screen provides evidence to assess core reduction and tool production. Generally, a low average weight in this size grade is associated with tool production and a high average weight in this size grade is associated core reduction. Since larger flakes weigh more than smaller flakes, thedistribution of weight is expressed as a proportion of total weight according to size grade to depict the size differences, and the count distribution is expressed as a proportion of total count according to size grade.

As previously stated the majority of raw material analyzed is Citronelle gravel chert (N=582).For this raw material, the average weight in size grade 3 is low (.46g), a figure that supports tool production. This data, in conjunction with the lack of cores recovered from the site, indicates that bifacial reduction was taking place. However, since the weight is so close to the .5 indicative for core reduction, it may signify that some core reduction may have been taking place as well.

In experimental studies conducted by Ahler (1989), it was demonstrated that the ratio of one-eighth inch size grade flakes to the sum of one-fourth, one-half and one inch size grade flakes may imply the type of reduction that produced them. Low ratios signify the early stages of reduction (hard hammer percussion and bipolar reduction) and high ratios signify late stages (soft hammer percussion and pressure flaking). The sample size of the assemblage is small and, therefore, suspect for this analysis. Nevertheless, these ratios (CG – .44, WQ – 1, BC – 1) indicate that all stages of reduction were taking place at Clark Lake.

Table 8

Average Weight by Size Grade

Material	SG1	SG2	SG3	SG4	SG4:SG1-3
1. Citronelle Gravel	1	17	385	179	
Total Wt.	39.40	79.54	178.73	17.300	.44
Avg. Wt.	39.400	4.68	0.464	0.097	
2. White Quartz	0	0	2	2	
Total Wt.	0.00	0.00	0.70	0.07	1.00
Avg. Wt.	0	0	0.350	0.035	
3. Burlington Chert	0	0	2	2	
Total Wt.	0.00	0.00	0.51	0.27	1.00
Avg. Wt.	0	0	0.255	0.135	
4. Clear Quartz	0	0	0	3	
Total Wt.	0.00	0.00	0.00	0.16	0.00
Avg. Wt.	0	0	0	0.053	
5. Tallahatta Quartzite	0	0	0	1	
Total Wt.	0.00	0.00	0.00	0.14	0.00
Avg. Wt.	0	0	0	0.140	
6. Coastal Plain Chert	0	0	2	0	
Total Wt.	0.00	0.00	0.46	0.00	0.00
Avg. Wt.	0	0	0.230	0	
7. Other Quartz	0	0	0	0	
Total Wt.	0.00	0.00	0.00	0.00	0.00
Avg. Wt.	0	0	0	0	
8. Pink w/veins	0	0	0	1	
Total Wt.	0.00	0.00	0.00	0.22	0.00
Avg. Wt.	0	0	0	0.220	
9. Total Count	1	17	391	188	
Total Wt.	39.40	79.54	180.40	18.16	2.18
Total Avg. Wt.	39.40	4.679	0.461	0.097	
% Count	0.17%	2.85%	65.49%	31.49%	
% Wt.	12.41%	25.05%	56.82%	5.72%	

Portion. Debris categories include complete, proximal, medial, distal, shatter, blocky fragments, and potlids (Table 9). Whole and fragmentary flakes comprised 67.3% of the debris classification for all excavations. A high percentage of blocky fragments and shatter (greater than 8%) generally indicates that, along with biface manufacture, some sort of core reduction activities were taking place. The combination of these two categories comprised 32.5% of the entire assemblage.

Table 9

Flake and Debris Classification for All Excavations

Material	Complet	Proxim	Media	Dista	Shatte	Block	Pot	Tota
1. Citronelle	559	49	10	30	153	0	0	801
2. White Quartz	6	1	0	0	7	0	0	14
3. Andesite	0	0	0	0	0	108	0	108
4. Basalt	0	0	0	0	0	34	2	36
5. Burlington Chert	6	0	1	0	6	0	0	13
6. Clear Quartz	3	0	0	0	7	0	0	10
7. TallahattaQuartz ite	1	0	0	0	4	0	0	5
8. Coastal Plain Chert	2	0	0	0	3	0	0	5
9. Other Quartz	2	0	1	0	1	0	0	4
10. Pink w/veins	1	0	0	0	0	0	0	1
11. Petrified Wood	0	0	0	0	0	1	0	1
Total	580	50	12	30	181	143	2	998
	58.1%	5.0%	1.2%	3.0%	18.1%	14.3%	.2	
		67.3%				32.7%		

Although Andesite and Basalt are included in the total count for all excavations, they are not included in the total count for the separate excavations because it is more likely that these microartifacts represent the use of ground-stone tool technology at Clark Lake.

For the 1999 excavation, whole and fragmentary flakes comprised 88% of the debris classification, and shatter and blocky fragments comprised 11%, suggesting that some core reduction and biface manufacturing was taking place (Table 10).

Table 10

Flake and Debris Classification for the 1999 Excavation

Material	Complete	Proximal	Medial	Distal	Shatter	Blocky	Total
Citronelle Gravel	493	41	8	25	65	0	632
White Quartz	1	0	0	0	1	0	2
Burlington Chert	3	0	1	0	1	0	5
Clear Quartz	0	0	0	0	1	0	1
Tallahatta Quartzite	1	0	0	0	4	0	5
Coastal Plain Chert	2	0	0	0	1	0	3
Petrified Wood	0	0	0	0	0	1	1
Total	500	41	9	25	73	1	
	77.0%	6.3%	1.4%	3.9%	11.2%	0.2%	649
		88.6%			11.4%		

For the 2009/2010 excavation, whole and fragmentary flakes comprised 47.3% of the assemblage, and shatter and blocky fragments comprised 52.7% of the assemblage (Table 11). This, too, suggests that core reduction and biface manufacturing was taking place.

Table 11

Flake Debris Classification for 2009/2010 Excavations

Material	Complete	Proximal	Medial	Distal	Shatter	Blocky	Total
1. Citronelle	66	8	2	5	88	0	169
2. White Quartz	5	1	0	0	6	0	12
3. Burlington	3	0	0	0	5	0	8
4. Clear Quartz	3	0	0	0	6	0	9
5. Coastal Plain	0	0	0	0	2	0	2
6. Other Quartz	2	0	1	0	1	0	4
7. Pink w/veins	1	0	0	0	0	0	1
Total	80	9	3	5	108	0	
	39.0%	4.4%	1.5%	2.4%	52.7%	0.0%	205
		47.3%			52.7%		

Heat Alteration. Heat alteration is another attribute that can provide insite into lithic technological strategies.Thermal alteration or damage may be caused by unintentional exposure to heat, such as flakes found in and around a hearth, or intentional exposure to heat, such as many types of chert intentionally heated to improve flaking quality. Nearly all of the flakes (81.4%) recovered from Clark Lake suffered some degree of heat alteration, whereas only 18% of the flakes were not altered by heat. Heat damage was observered in only .06% of the of the flakes. Of the materials that experienced thermal alteration, 97.5% were Citronelle gravel chert, 1.6% was Burlington Chert, and .06% was Coastal Plain chert. The high percentage of flakes with heat alteration is not unexpected since Citronelle gravel chert is the most frequent type of raw material found at the site. The consistent heat treatment of Citronelle gravel chert implies that this was part of the lithic technological strategies used at Clark Lake

Reduction stage. All flakes, regardless of size were assigned to a reduction stage (Table 12). As noted in Chapter V, early stage flakes are primarily the result of core reduction, middle stage flakes are primarily the result of the initial trimming of bifacial tool production, and late stage reduction is primarily the result of thinning, preparation of edges, and the shaping of hafting components. Flakes produced as a likely result of biface thinning were included in the late stage category and are counted as such.

While the criteria that was originally proposed by Magne (1985) and further outlined by Bradbury and Carr (1995) were utilized to characterize flake attributes, two limitations of Bradbury and Carr's study must be noted. First, they used only large tabular nodules of Fort Payne Chert and, second, they only considered flakes larger than .64 cm (1/4 inch). Nevertheless, there have been some excavations, most notably in the

Pine Hills region of Mississippi, that have recognized the importance of analyzing the smaller size grades (<.64 cm) in an assemblage (Fields & Rochester, 2003; Jackson & Fields, 2000; Jackson, Santure, Hensley, Martin, & Leist, 2007; Jackson & Wright, 2000). Therefore, as aconsequence of size grade, size grade 4 was generallyplaced in the angular shatter category, unless the flakes were complete, such as would typically be seen with pressure flaking when finishing a tool. Size grade 5 (n=276) was eliminated from the inferential analysis, noting instead the potential significance that this size range comprises 27.7% of the total debitage assemblage.

Table 12

Reduction Stage

Size Grade	Early	Middle	Late/ BFTF	Angular Shatter	Eroded	Blocky Fragment	Total
1	1	0	0	0	0	0	1
	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
2	14	3	6	6	0	0	29
	1.9%	0.4%	0.8%	0.8%	0.0%	0.0%	4.0%
3	156	90	168	32	1	0	447
	21.7%	12.5%	23.3%	4.4%	0.1%	0.0%	62.1%
4	48	15	157	20	2	1	243
	6.7%	2.1%	21.8%	2.8%	0.3%	0.1%	33.8%
Total	219	108	331	58	3	1	720
	30.4%	15.0%	46.0%	8.1%	0.4%	0.1%	100.0%

All 720 flakes, whether whole or fragmented, were assigned to a reduction stage (Table 12). The largest majority of flakes (N=331, 46%) were late stage flakes, followed closely by early stage flakes (N=219, 30.4%). Middle stage flakes only comprised 15% (N=108) of the assemblage. This suggests that bifacial tool production and maintenance was the primary reduction activity, followed closely by core reduction. The importance of biface manufacture and maintenance is further substantiated by the overwhelming amount ofLate stage flakes (N =331, 46%), size grade 3 (N=447, 62.1%) and size grade 4 (N=243, 33.8%) flakes found across the site. Generally, the size of flakes should decrease as tool manufacturing progresses through reduction activities. The importance of core reduction is further substantiated by the amount of shatter and blocky fragments (N=59, 8.2%), coupled with the large amount of early stage flakes (N=219, 30.4%). However, only two cores were recovered from the site, one of which was recovered out of context.

To place this data into further perspective, the interpretation of this data can be further clarified by comparing it to data from similar sites. These sites include one residential base camp and one special purpose site from Green County, MS, and two residential sites in Forest County, MS. They are used for comparison because they are the first to" incorporate the information potential of small sized debitage" (Jackson et al., 2007) and because of the high amount of Citronelle gravel chert that was recovered from the sites. Analysis of the different site assemblages could be associated with specific components. The two activity areas at 22GN680 were interpreted to represent predominantly biface manufacture, while 22GN687 was interpreted to represent core reduction activities. Two sites, 22F01234 and 22FO1235, were interpreted has having a mix of both strategies. As can be seen in Table 13, Clark Lake also falls in the middle between the two extremes for the Middle Stage, and at the extreme ends for the Early and Late Stages, indicating a mix of strategies being implemented for reduction activities.

Comparisons with other sites necessitate removing SG4 and SG5 from the analysis. Table 14 presents comparisons from other sites based solely on material greater than and equal to SG3. It should be noted that this alters the distribution of stages at Clark

Table 13

Comparison with Stage Composition of Debitage from Selected Activity Areas at22GN680, 22GN687, 22FO1234 and 22FO1235.

Site	Early Stage	Middle Stage	Late Stage including Biface Thinning Flakes
1. 22GN680 Woodland Activity Area 1	33	26	41
2. 22GN680 Woodland Activity Area 2	27	14	59
3. 22GN687 Late Woodland	26	24	50
4. 22FO1234	27.5	25.9	46.6
5. 22FO1235	41	16.6	42.3
6. 22SH535	47.1	22.5	30.4

(Based on Fields 2005: Table 7.52).

Table 14

Comparison with Stage Composition of Debitage from Selected Sites Omitting SG4 and SG5

Site	Early Stage	Middle Stage	Late Stage including Biface Thinning Flakes
1. 22GN668 (CG)	20.6	35.8	43.6
2. 22PE839	58.7	28.2	12.1
3. 22FO1023	52.6	19.8	21.8
4. 22FO1234	24.4	18.2	57.4
5. 22FO1235	42.5	16.5	41
6. 22SH535 (CG)	63.3	35.8	8

Source: Jackson et al. 2007

Lake, increasing the Early and Middle Stage and decreasing the Late Stage. 22FO1023, 22PE839, and 22FO1235 are distinguished as having a high amount of Early Stage flakes, whereas 22GN668 and 22FO1234 are distinguished as having a low amount of Early Stage flakes. 22FO1023 was interpreted as being an intermittently occupied hunting stand or special purpose site; 22FO124 and 22FO1235 have been interpreted as residential sites. Clark Lake falls at the extreme ends of the stages, indicating core reductive activities taking place. This comparison presents the ambiguity introduced when the smaller size grades are omitted from consideration in the interpretation of an analysis.

Platform and dorsal cortex. Platform remnant count and dorsal cortex amount are two other attributes that may illustrate the type of reduction activities that took place at Clark Lake. The way in which a biface or core is reduced is reflected in the type of platforms found on flakes. A crushed platform is commonly believed to have been the result of hard hammer percussion and is thought to be a common occurrence in core reduction activities. For complete and proximal flakes, crushed platforms constitute 38.2% (N=365) of the lithic assemblage. Lipped platforms are associated with soft hammer percussion and bifacial thinning. Of all the flakes in this assemblage, lipped platforms comprises 4.8% and cortical/ lipped platforms comprises .7% of the assemblage suggesting that bifacial manufacturing and maintenance played only a small part in the reduction activities at Clark Lake and core reduction played a more prominent role (Table 15).

Table 15

Platform Remnant Type

Crushed	Flat	Cortical/Lipped	Cortical	Lipped	Eroded	Total
365	468	7	69	46	1	956
38.2%	49.0%	0.7%	7.2%	4.8%	0.1%	100.0%

The amount of cortex on a flake helps to determine if the raw material procured for lithic reduction was brought back as cores, bifaces, or in its original shape. However, the amount of cortical coverage is dependent upon the type of material used for reduction.

With the amount of Citronelle gravel chert recovered from the site, this does not seem to be a significant factor because this type of chert is most often procured in the form of small pebbles and cobbles and, when these are reduced, some of the cortex is often retained on some or all parts of the flake. A substantial number of flakes (54.5%) (N=631) did not show any amount of cortex (Table 16). However, almost 45.5% (N=294) of flakes did exhibit some cortex, and of this 45.5%, 45.9% (N=135) did have more than 50% of cortex, suggesting that raw materials were procured and brought back to the site in the form of preforms, as well as small cobbles and pebbles, which have a tendency to retain some cortex into middle and late stage reduction.

Table16

Dorsal Cortex Coverage

Raw Material	No Dorsal Cortex	1-49%	50-99%	100%	Total
1. Citronelle Gravel Chert	340 53.9%	158 25.0%	73 11.6%	60 9.5%	631 97.7%
2. Tallahatta Quartzite	1 100.0%	0 0.0%	0 0.0%	0 0.0%	1 0.2%
3. White Quartz	3 60.0%	1 20.0%	0 0.0%	1 20.0%	5 0.8%
4. Coastal Plain Chert	1 50.0%	0 0.0%	1 50.0%	0 0.0%	2 0.3%
5. Clear Quartz	2 100.0%	0 0.0%	0 0.0%	0 0.0%	2 0.3%
6. Burlington Chert	4 100.0%	0 0.0%	0 0.0%	0 0.0%	4 0.6%
7. Pink w/veins	1 100.0%	0 0.0%	0 0.0%	0 0.0%	1 0.2%
Total	352 54.5%	159 24.6%	74 11.5%	61 9.4%	646 100.0%

Dorsal scars and facets. Dorsal scars and facet count are the last two attributes that may illustrate the type of reduction activities that took place at Clark Lake. Magne(1985) has determined dorsal scar count is considered to be the single best attribute for non-platform bearing flakes and facets to be the single best attribute for platform bearing flakes. The number of dorsal scars can help to gauge the number of previous removals and provide information regarding reduction stage. Particular attention is paid to a core,cobble, or pebble during the process of removing flakes, and it is this attention to detail that suggests that flakes with more dorsal scars would indicate later stage reduction. With this in mind, zero to one scar is considered to be early stage reduction, flakes with two scars is considered middle stage reduction, and flakes with three or more scars would

indicate late stage manufacturing. Table 17 presents the number of dorsal scars by size grade. Only whole flakes are included, since partial flakes might be missing some dorsal scars.

Table17

Dorsal Scars by Size Grade

Dorsal Scars	1	2	3	4	5	Total
0-1	0	1	170	85	20	276
	0.0%	0.4%	61.6%	30.8%	7.2%	48.1%
2	0	4	98	57	6	165
	0.0%	2.4%	59.4%	34.5%	3.6%	28.7%
3+	0	11	91	29	2	133
	0.0%	8.3%	68.4%	21.8%	1.5%	23.2%
Total	0	16	359	171	28	574
	0.0%	2.8%	62.5%	29.8%	4.9%	100.0%

The majority of flakes have one or less dorsal scars (N=276) with one-third of the assemblage having just one scar (N=192). On many one scar flakes (N=47), cortex and the flake scar divide the dorsal surface 58.3% of the flakes with one scar retain at least 1% to 100% of cortex. The overall data, however, contradicts the data concerning reduction stage by size grade (see Tables 12) for the early and late stages of reduction but supports the data for the middle stage of reduction. On the other hand, this data does support the argument that dorsal scars may not be a great indicator of reduction stage because it is an attribute that is difficult to consistently measure. Another reason this attribute may not be a good indicator is due to the use of Citronelle gravel chert. The small size of the Citronelle gravel cobbles and pebbles used for the manufacturing of tools does not allow for the production of large flakes because there is not enough of the dorsal surface to get much representation ofprior flake removals from the objective piece. For this reason, the data was calculated again, leaving out the smaller size grades.

Table18

Dorsal Scars by Size Grade 1-3

Dorsal Scars	1	2	3	Total
0-1	0	2	171	173
	0.0%	1.2%	98.8%	45.9%
2	0	4	98	102
	0.0%	3.9%	96.1%	27.2%
3+	0	11	91	102
	0.0%	10.8%	89.2%	27.2%
Total	0	17	360	375
	0.0%	4.5%	95.5%	100.0%

Most of the flakes, again, have one or less dorsal scars (N=173), with 34.1% of theassemblage (N=128) having just one scar. On many one scar flakes (N=128), cortex and the flake scar divide the dorsal surface, and 23.4% of the flakes with one scar retain at least 50% to 99% of cortex.

Facet numbers, the number of removals from a platform surface, reflect the preparation of the core prior to flake removal and, thus, may provide information about reduction stage. Usually, a higher number indicates the late stage of reduction, while a smaller number indicates an earlier stage of reduction. The criteria for determining the stages of reduction for facets are the same as used for dorsal scar count. Overwhelmingly, when facet count is used, the majority (90.8%) of flakes (N=570) would be considered to be the early stage of reduction, while there would be very few middle to late stage flakes (Table 19).

Table19

Facet Count by Size Grade

Facet Count	1	2	3	4	5	Total
0-1	1	12	356	173	28	570
	0.2%	2.1%	62.5%	30.4%	4.9%	90.8%
2	0	5	32	14	1	52
	0.0%	9.6%	61.5%	26.9%	1.9%	8.3%
3+	0	1	4	1	0	6
	0.0%	16.7%	66.7%	16.7%	0.0%	1.0%
Total	1	18	392	188	29	628
	0.2%	2.9%	62.4%	29.9%	4.6%	100.0%

Expedient Flake Tools. Only two flakes recovered exhibited some sort of retouch to the marginal edges. Flakes were classified as utilized or retouched based on some minor edge trimming that was confirmed under a microscope. The lack of other expedient flake tools seems to suggest that formal tools were more than likely favored over informal, expedient tools; the large amount of early stage flakes and shatter debris made from the locally available Citronelle gravel chert found in the assemblage indicates that a biface strategy was being utilized and that expedient tools were being manufactured.

Spatial Patterning of Lithic Debitage

One of the unique features of this site is the sizeable amount of debitage found in Unit N1003 E1105 (N=559). In an attempt to understand why there was so much debitage, the area around this unit was excavated to understand the activities that took place and to understand site function. Site functions and activities vary, and this variability should be detectable in the archaeological record through discrete clustering of materials.

The frequency and density of artifacts can dramatically vary from one area to the next, which can be attributed to the archaeological patterning of segregated activities of the inhabitants of the site (Metcalf & Heath, 1990). From this clustering of materials, similar patterns regarding activities should emerge. This pattern is affected by the relative amount of time a site is used. As Binford (1980) suggests, "a residential base camp is the hub of subsistence activities,"and"it is where most processing, manufacturing, and maintenance activities take place" (Binford, 1980, p. 7). Therefore, it becomes necessary to look at the spatial patterning surrounding the original unit (Figure 13).

In total, within this area of excavation, 937 pieces of debitage were recovered, compared to the 67 pieces of debitage found throughout the rest of the site. Debitage was found in all of the test units with the exception of the northwest quadrant of N1002 E1104. The majority of the lithics (N=826) were recovered between 10 and 30 cmbs,

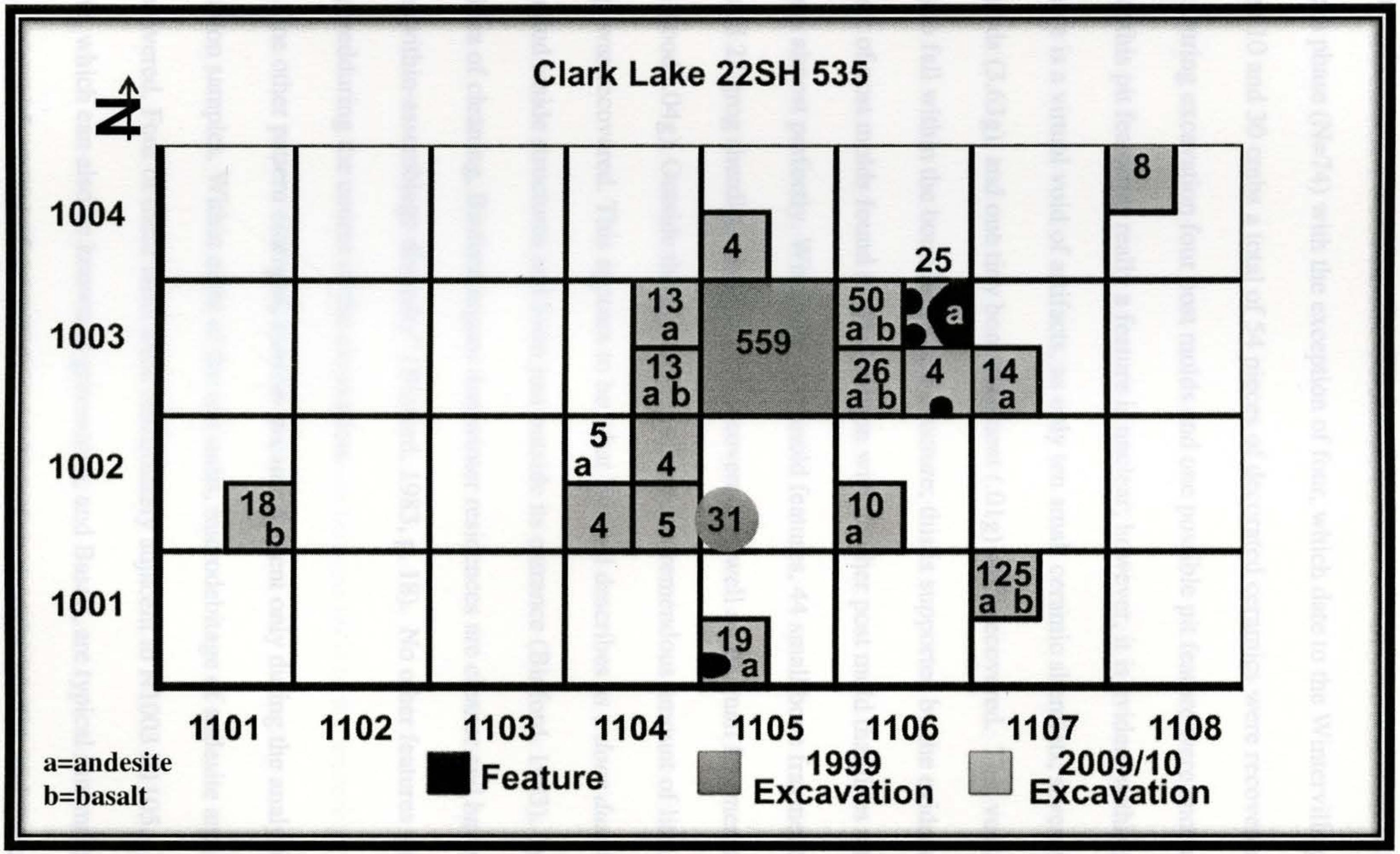

Figure 13. *Excavation Map with Lithic Counts.*

with level 2 containing the most lithics (N=619). This corresponds well with the amounts of decorated ceramic assemblage (N=78) found in these units, all of which date to the Issaquena phase (N=74) with the exception of four, which date to the Winterville phase. Between 10 and 30 cmbs a total of 54 pieces of decorated ceramics were recovered.

During excavation four post molds and one possible pit feature were encountered. Whether this pit feature is really a feature is unclear; however, it is evident within this area, there is a virtual void of artifacts, as only ten small ceramic sherdlets, seven small grog sherds (3.63g), and one tiny bone fragment (.01g) were recovered. This void appears to fall within the boundaries of a structure; this is supported by the evidence of a paired set of post molds found in combination with another post mold that lines up with the others almost perfectly. Within the post mold features, 44 small bone fragments (.02g) and 22 grog sherdlets (19.8g) were recovered, as well as 20 small fragments of burned wood (.04g). Outside the structure is where the tremendous amount of lithic debitage was recovered. This appears to be what Binford describes as a *door dump* which is generated inside structures and form just outside its entrance (Binford, 1983). Included in this idea of cleaning, Binford argues that winter residences are cleaner and have "greater within-assemblage diversity" (Binford, 1983, p. 18). No other features were encounteredduring the course of the excavation.

One other pattern emerged, but this became evident only during the analysis of the flotation samples. Within eight of the test units, microdebitage of andesite and basalt were recovered. Four of these units were immediately adjacent to N1003 E1105. Andesite, which can also be known as greenstone, and Basalt, are typical raw materials used in the manufacturing of ground-stone tools such as mortars, pestles, and nutting stones, which are used in the processing of food, or as hammerstones. This evidence is further corroborated with the addition of possible charred acorn nut found in the same levels (10-30 cmbs).

Summary

Diagnostic artifacts at Clark Lake indicate the site was occupied as early as the Tchula period around 400 B.C., during the Middle Woodland period, and continued to be repeatedly occupied over the next 2,000 years into the Mississippian phase around the time of contact with Europeans. In addition to the temporally diagnostic artifacts, several stone tools were recovered over the course of two excavations. These tools include bifaces, hafted end scrapers, cores, biface fragments, and ground-stone tool microdebitage. The debitage analysis indicated that a wide range of production activities such as core reduction and biface manufacturing and maintenance took place at Clark Lake, and that Citronelle gravel chert is the preferred raw material for the manufacturing of stone tools.

These results are comparable to the results from the Mossy Ridge site located in Green County, Mississippi with one exception: shatter. In the Green County report, Fields and Rochester (2003) found that biface manufacturing and maintenance were the dominant activities utilizing Citronelle gravel chert because 40% of the assemblage was classified as Late Stage, followed by 26% of the assemblage for Early Stage, and 10% for Middle Stage. At Clark Lake, 39.5% of the assemblage was classified as Late Stage, followed by 26.9% of the assemblage for Early Stage, and 12.6% was Middle Stage. However, in the Mossy Ridge assemblage, only 4% of the assemblage was identified as shatter. This indicates that core reduction activities did not significantly contribute to the activities taking place at the site, whereas at Clark Lake shatter comprised 18.7% of the assemblage. This indicates that core reduction activities did significantly contribute to the activities taking place at the site. The lack of expedient tools seems to suggest formal tools were preferred over informal tools; however, the large amount of early stage flakes coupled with the high amount of shatter indicates expedient tools were being manufactured,which suggests a preference for residential mobility.

Spatial patterning suggests Clark Lake was a residential base camp.This is made evident by the lithic debitage recovered and indicates that a wide range of activities took place that included processing, manufacturing, and maintenance activities.

CHAPTER VII

CHAPTER II DISCUSSION AND CONCLUSION

The goals of this thesis project centered on presenting an analysis of the lithic debitage recovered over the course of two excavations from Clark Lake (22SH 535) using methods developed by lithics researchers in order to understand settlement, mobility patterns, and the organization of technology of a small-scale Middle to Late Woodland settlement. It was also an opportunity to contribute data for an area of research in which the data is sorely lacking. Current models of prehistoric cultures indicate the Lower Mississippi Valley was influenced by a number of regional cultures, such as Poverty Point, Tchefuncte, Hopewell, Baytown, Coles Creek, and Mississippian, but these cultures were either antecedents or predecessors to what took place at Clark Lake. The questions, then, are what is the function of this small scale Middle Woodland settlement, what is the settlement organizational pattern of the prehistoric hunter-gatherers that occupied the site, and how does it fit in to the larger picture of what came before it and what came after it?

Discussion

As previously discussed in Chapter VI, site functions and activities vary, and this variability should be detectable in the archaeological record. Hypothetical models with certain expectations and implications were proposed for the different types of artifact assemblages in order to try to understand specific site functions, settlement patterns, mobility, and the organization of technology. The different characteristics of the stone tool assemblage are used to make inferences about settlement, mobility, and the organization of technology in which the prehistoric occupants of Clark Lake engaged.

Settlement Organization and Mobility Strategies

The assemblage of artifacts from the Clark Lake site is a coarse-grained assemblage when it is viewed in its entirety. The ceramics recovered from the site range from possible fiber-tempered ceramics and Tchefuncte Plain, which are chronologically assigned to the Tchula Period or before, to Parkin Punctated, which is assigned chronologically to the Lake George phase in the Late Mississippian period. However, when the ceramic assemblage was broken down and plotted according to the units in which they were found, one can see that Clark Lake becomes a fine-grained assemblage with respect to the artifacts' chronological placement in time and space. This is distinguished from other areas relative to the site's occupational period. Throughout the site, the artifacts are ubiquitously scattered in their distribution and chronology. A change in the artifacts across the landscape through time and space is seen from one end of the site to the other. The observed change follows a path that parallels the edge of the lake, which is located less than 100 meters away from the site. From this change, it can be inferred that Clark Lake was repeatedly occupied over time, and indicates that the occupants of Clark Lake were mobile.

Residential Site or Special Purpose Logistical Site?

Taking the aforementioned repeated occupation of the site and the mobility of its occupants into account, Clark Lake can be differentiated into a residential site. According to Binford,

> foragers found in environmental settings with very different incidences and distributions of critical resources. In settings with very different patterns of residential mobility may be *tethered* around a series of very restricted locations such as water holes, increasing the year to year

> redundancy in the use of particular locations as residential camps. The greater the redundancy, the greater the potential buildup of archaeological remains, and hence the greater the archaeological visibility. (Binford, 1980, p. 9)

Thus, the site, being located near a "water hole" increases the possibility of it being a residential site, as well as the redundancy in the buildup of archaeological remains. Other evidence that points to Clark Lake being a residential site include the stone tool trajectory, the decorated to undecorated ceramic ratio, post molds, and the differentiation between different activity areas.

According to Ahler (1989), one can expect flaking debris to be a diverse mixture of byproducts from early and late stage core reduction and bifacial tool manufacturing, as well as an abundance of debris from tool finishing and maintenance at long-term sedentary or semi-sedentary residential sites (Ahler, 1989, p. 106). The Clark Lake lithic assemblage is dominated by late stage flakes (37%), which represent the manufacture and maintenance of bifacial tools, followed closely by early stage flakes (36%), which represents core reduction was taking place. Twenty percent of the flake assemblage represents the Middle Stage of flakes. This indicates that tools were being manufactured for a wide range of functional needs. Stone tools recovered from the site include PP/Ks broken during initial manufacturing, during resharpening activities, while completing multi-functional tasks, or from further thinning during the later stages of manufacture. Other stone tools, such as the cores, the hafted end scraper (although found out of context), the sandstone abraders, and the burnishing stone were found, as well, indicating loss through discard, abandonment, or replacement. Such an all-encompassing range of tool requirements and behaviors are characteristics of residential base camps.

In addition, the 1:36 ratio of decorated to undecorated ceramics seems to indicate the vessels recovered from the site were used for storage or cooking. Such items, ordinarily, would not be necessary at a special purpose or task specific locations that would only be inhabited for a short duration. According to Binford (1983), if a site was a special purpose or task specific site, even though there is an accumulation of artifacts across a site that may make it appear as if it were a residential site, one would only see activity areas related to that special purpose or specific task, rather than a general dispersal of artifacts in no particular order concentrated in one specific area. As previously discussed, the Clark Lake assemblage is generally concentrated in specific areas scattered throughout the site relative to their chronological placement and to the types of artifacts recovered from the site. The lithic assemblage, in particular, is found in one specific area. This differentiation of activity areas indicates that more than one kind of activity was taking place at Clark Lake, and the different types of activities taking place are characteristic of residential sites.

As previously indicated, other evidence used to support the fact that Clark Lake is a residential site are the post mold features uncovered approximately 30 cmbs. In modern ethnographic studies, it has been shown that there are no known cases among hunter-gatherers where shelter is not fabricated in residential sites, regardless of the duration of occupation. Only in rare occurrences are sites produced where no shelter is provided for the occupants. Additionally, if a structure were expediently constructed, only hearths and lithic scatters would be seen within the archaeological record (Binford, 1990). The post molds indicate the house site was prepared for construction, rather than simply built on the surface. Labor was invested in digging out the ground to place posts to frame and support the structure. Hunter-gatherers would not invest this much time or effort if this was a special purpose or task-specific site that would only be occupied for a short duration of time.

As previously discussed in Chapter II, the spatial structures of artifact distribution are useful for delineating possible activity areas in cases of primary refuse deposit at the location of manufacture or use, or discard in secondary locations. The presence of post molds appear to separate areas of high flake density and those with lower density, which suggests the high concentration of flakes in unit N1003 E1105 may be due to sweeping up the debitage within a structure and dumping it in a pile outside. This type of behavior is expected in a residential site that was occupied for some duration, and indicates the structure was extensively used.

Site Patterning and Mobility

Since both foragers and collectors can produce residential sites, it becomes necessary to understand site patterning and mobility. Site patterning arises from "the interaction between *economic zonation*, which", according to Binford, "is always relative to specific places, and tactical mobility, which is the accommodation of a system to its broader *environmental geography*" (Binford, 1982, p. 6). With hunter-gatherers, there "tends to be a regular pattern of land use centered on a residential location" (Binford, 1982, p. 6). From this centralized residential location, hunter-gatherers establish different zones to meet their subsistence needs. Zones immediately surrounding the camp may quickly be overexploited and, consequently, may provide very little in the way of food, except for areas located near the residential site where the resources are highly aggregated and easily renewed, such as would be seen with the Clark Lake site.

According to Binford (1980), "residential placement in a logistical system is a compromise strategy relative to already known resource distributions" and "the variability in the contents of residential sites will generally reflect the different seasonal scheduling of activities" (Binford, 1980, p. 9). That Clark Lake is located on what is now an oxbow lake shows perhaps this type of compromise was unnecessary since the area surrounding the site was rich in renewable resources such as fish, game, and wild plants. It appears as though Clark Lake was logistically organized in a zone perfectly situated to meet most of the occupants' subsistence needs; however, there is very little identifiable floral or faunal archaeological evidence to support this statement because the acidic nature of the soil precludes their recovery. The very little evidence that was recovered includes possible acorn and possible persimmon seeds, but further testing of the botanical remains is necessary to make a definitive determination.

Even though Clark Lake is characterized by a relatively homogeneous environment and the resources were predictable, the occupants of the site still practiced residential mobility within a logistically organized system. Every spring, when the lake or rivers would overflow, the occupants would move to another site and then return when the conditions allowed. Logistical forays were still necessary for collecting the raw materials necessary for the manufacturing of stone tools or for whatever else the occupants of Clark Lake might have needed for subsistence. This reoccupation of the site is evidenced by the ceramics that were disbursed throughout the site, which covered a time-span of approximately 2,000 years.

Another indication that the residents of Clark Lake were residentially mobile in a logistical system was the recovery of Citronelle gravel chert flakes, as well as the recovery of two expediently manufactured flakes. According to Parry and Kelly(1987), mobility plays a large part in determining the how prehistoric hunter-gatherers organize their technology because it dictates the access to raw material; as well as the types of tools needed. Given that the Citronelle gravel chert is located less than 8 km from the site, logistical forays would have been necessary to obtain the raw material necessary for the manufacturing of tools. This would have been embedded in the subsistence practices of the occupants of Clark Lake because hunter-gatherers would not have set out just to solely procure raw material.

Since mobility can dictate the types of tools that are needed, relatively sedentary people who do not move long distances residentially or logistically, and who have access to locally available raw material do not need to manufacture portable lithic tools. According to Parry and Kelly they only need expediently manufactured tools "to fulfill a specific short-term task" (1987, p. 300). The recovery of only two expediently manufactured tools may quite possibly indicate, what Parry and Kelly suggests is, "a strategic decision [by the inhabitants of Clark Lake] to reduce the effort invested in creating and maintaining the stone tool kit, in a context of changing needs and changing allocation of resources" (Parry & Kelly, 1987, p. 304). In light of the changing needs and changing allocation of resources at Clark Lake, expediently produced tools could be considered "disposable byproducts in the context of [their] use" (Binford, 1983, p. 262) and, in a sense, would be considered personal gear that were prepared in anticipation of their use for a specific activity (i.e., the scaling and processing of fish) and then disposed of at their place of use. Expediently manufactured tools used in this fashion most likely would not be found in any archaeological context at the site because they would have been produced to increase efficiency at the residential camp or location or both.

A correlate to the use of an expedient core technology appears to be a shift in settlement patterns. This shift occurred about the same time villages began to be permanently occupied and suggests, at the very least, a reduction in residential mobility took place and hunter-gatherers became more sedentary. It has been noted that there is a strong correlation between mobility patterns and house plans, and it has been shown that semi-sedentary and sedentary hunter-gatherers prefer to construct houses with a rectangular plan followed by semi-circular and elliptical plans (Binford, 1990). The set of paired post molds in the northeast quadrant of unit N1003 E1106, coupled with the one other post mold in the southeast quadrant appear to be formed in a semi-circular or elliptical pattern, but without further excavation it would impossible to determine the exact structural pattern. The fact alone that post molds were found at Clark Lake indicates that at the very least the occupants of Clark Lake were building somewhat permanent structures, which would be indicative of decreasing residential mobility and increasing sedentism. What could have prompted this shift for the residents of Clark Lake is beyond the scope of this work; however, it is an area in which further study and research is necessary and sorely lacking for the Delta.

Mobility, Trade, and Exchange

A main characteristic of the Middle Woodland period is the increase of local and interregional trade and exchange of exotic materials. The dominance of local material in the assemblage suggests the residents of Clark Lake were becoming sedentary and the presence, however little (5%), of high quality raw material flakes in the Clark Lake assemblage indicates, at the very least, that some form of reciprocal movement of goods between individuals or groups of individuals took place.

Methodology

One important aspect of doing archaeology is the methodology employed when excavating a site. Important to planning a good research design is determining what questions you are trying to answer with your research problem. Inherent to this includes what kind of data is appropriate and necessary to solve the research problem and how the data will be collected. Oftentimes one must amend his or her research design to include unexpected results from the data that has been recovered. Sometimes this may be done during the course of the original excavation, and other times additional excavations may be needed to collect the additional data necessary to answer further questions that may arise. Such was the case for the Clark Lake excavation. Since the first excavation produced an enormous amount of flakes from one unit on the very last day of excavation, there was no time to investigate the anomaly completely.

In the original research design, the field methodology included excavating in arbitrary 10cm levels, screening the fill dirt with one-fourth inch hardware cloth and taking flotation samples, which were split into heavy and light fraction. The amended research design field methodology for the second excavation included excavating in arbitrary 5 cm levels after the first 10 cm, screening the fill dirt with one-eighth inch hardwire cloth and taking floatation samples, which were floated and then screened to down to a .25mm sample. The differences between the two excavations is one of degree and not kind, and distinguishes the potential information that could be lost given a particular research design. The use of specific screen size in the recovery of archaeological materials is a widely debated topic both in zooarchaeological and in lithic contexts. Some researchers maintain that the use of finer screen size does not yield any more significant results than the standard screen size. Within this particular study, it was shown that 83% of the lithic materials recovered from the 2009/2010 excavation were from size grades 4 and 5. These small size grades indicate tools were being maintained at the site, a point which would have been lost if a larger screen size was used. The use of a smaller screen size can also aid in the recovery of smaller sized zooarchaeological and botanical remains, which would help analysts to understand local, as well as regional, subsistence practices of a particular culture or cultures.

Conclusions

From this it can be concluded that Clark Lake was a residential base camp located within a logistically mobile system that encompassed a time span of an almost continuous occupation of approximately 2,000 years. The inhabitants of the site participated in a wide range of production activities that includes, but is not limited to, the processing, manufacturing, and maintenance of lithic stone tools, as well as the possibility of processing and manufacturing of ceramics. This is supported by the diversity of the ceramic assemblage, the analysis of the lithic stone tool assemblage and debitage (both macro and micro), as well as spatial patterns of activity and patterns of disposal.

Suggestions for Future Research

To further confirm the findings of this study, there is a need that exists for settlement pattern studies of the Tchula and Woodland periods. A need also exists for a more extensive investigation of the social, political, economic, subsistence, and religious subsystems of these periods, as very little is currently known. The lack of knowledge, apart from the ceramic assemblages, is apparent. An intensive survey of known sites, as well as locating new sites, would contribute important information in determining the cultural practices of the people who inhabited the Yazoo Basin. Other avenues of research should include the study of gender and the possibility that women may have been the primary knappers, as opposed to men at residential sites, as well as looking at a lithic assemblage in terms of the level of experience of knappers. How archaeological assemblages are perceived would change in light of these different avenues. Another important avenue to consider is a reevaluation of lithic assemblages that were conducted before the development of attribute analysis. By reevaluating these assemblages, new light may be shed on the classification of the different site types and new patterns may emerge, which would provide for an even more complete picture of how prehistoric peoples utilized resources, moved across the landscape, and organized their technology.

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